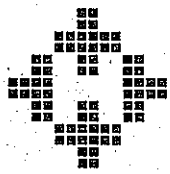
Population Health Information System
1991/92

Utilization of Hospital Resources

Volume I: Key Findings

December 1993



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The Manitoba Centre for Health Policy and Evaluation

The Manitoba Centre for Health Policy and Evaluation (MCHPE) is a unit within the Department of Community Health Sciences, Faculty of Medicine, University of Manitoba. The MCHPE is active in health services research, evaluation and policy analysis, concentrating on using the Manitoba health data base to describe and explain patterns of care and profiles of health and illness.

Manitoba has one of the most complete, well-organized and useful health data bases in North America. The data base provides a comprehensive, longitudinal, population-based administrative record of health care use in the province.

Members of the MCHPE consult extensively with government officials, health care administrators, and clinicians to develop a research agenda that is topical and relevant. This strength, along with its rigorous academic standards and its exceptional data base, uniquely position the MCHPE to contribute to improvements in the health policy process.

The Centre's researchers are widely published and internationally recognized. They collaborate with a number of highly respected scientists from Canada, the United States and Europe.

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Executive Summary

On a per capita basis, Winnipeg and rural residents spent a similar number of days in hospital in 1991/92, but had fundamentally different patterns of using hospital care. For acute care (stays lasting from 1 to 59 days), non-Winnipeg residents had 66 percent more separations from hospital and used 37 percent more hospital days than did Winnipeg residents. In contrast, Winnipeg residents used 79 percent more days of hospital care for long stay separations (stays of 60 days and over) and spent 72 percent more of their acute hospital days in technologically sophisticated teaching hospitals relative to rural residents.

In addition to rural/urban differences, there was marked variation across eight Manitoba regions in rates of use of acute hospital care. Variability in use of acute pediatric care was especially high, with adjusted rates varying five-fold across regions, ranging from 35 days to 170 days per 1000 total residents. Over all acute care, Winnipeg residents had the lowest adjusted rates of use and northern areas had the highest rates. Greater use of short stay hospital days was associated with higher rates of use of specific types of care: hospitalizations for patients who had less complex medical conditions and were less severely ill, for care that was less intensive in terms of resource utilization, for very short stays, and for medical diagnoses for which there is an element of discretion in the decision to use hospital resources, some of which may be related to patient socioeconomic factors.

In spite of regional variation in use of acute hospital resources and lower rates of use of teaching hospitals by rural residents, persons residing outside of Winnipeg appeared to have adequate access to surgery and to resource intensive treatments such as bypass surgery and craniotomy. In particular, there were only small differences in overall rates of surgery despite a concentration of surgical specialists in Winnipeg.

The very high rate of use of long stay hospital days by Winnipeg residents (in relation to residents of rural regions) is unexplained. On the surface, it appears unrelated to a shortage of personal care home beds: Winnipeg and non-Winnipeg regions have similar adjusted rates of use of personal care home days per capita, measured both for the population age 75 years and older and the total population (DeCoster, Roos, and Bogdanovic 1993; DeCoster,

personal communication). Winnipeg residents' much higher rate of long stay days in chronic hospitals suggests either higher rates of access for Winnipeg residents, or that rural persons who have long stays in chronic care settings become labelled as Winnipeg residents over time. This finding of high rates of use of long stay days has important implications for resource use: almost one half of hospital days used by Winnipeg residents were used in long stay care and over one quarter of provincial hospital days were used to provide long stay care to Winnipeg residents. These findings were large and unexpected; reasons for the different patterns of use of long stay care need further investigation.

While further work is required to relate indicators of need to utilization rates, Manitoba's acute care hospital system, when described at the regional level, appears to work equitably and in response to different levels of need. The two regions with the highest use of hospitals were also those areas whose residents had the poorest health (as judged by rates of death among those aged 0 to 64 years) and the highest level of socioeconomic risk. In contrast, lower rates of use by Winnipeg residents corresponded to relatively low measures of need in this population. Rates of use were higher than would be expected in Central and Westman, two 'healthier' rural regions.

The finding of very large differences in needs-driven use of acute hospital resources raises important policy questions. Clearly, the system provides a remarkably high level of care to residents of disadvantaged regions. However, given the strong relationship between socioeconomic risk factors, health status, and use of hospital resources, questions emerge about whether investments in high use of hospital resources represent an effective approach to improving population health or whether alternative approaches are more likely to yield benefits.

Utilization of Hospital Resources
Volume I: Key Findings

1. Introduction

1.1 Population Health Information System

In January, 1991, the Manitoba Centre for Health Policy and Evaluation (MCHPE) was established at the University of Manitoba to provide Manitoba Health with research-based analysis, evaluation and identification of policy options. The researchers agreed to undertake several specific projects each year as well as to develop a health information system for the Province.

The Population Health Information System is designed to focus on the link between health care utilization and health, to make it possible to examine how effectively and efficiently a health care system produces (or fails to produce) health across various regions of the Province. We have attempted to develop an information system that supports rational decision-making and that ultimately shifts discussions from a focus on the demand for health care to a demand for health. The system is population-based, designed to track the health status and health care use of residents of given regions regardless of where such use takes place, an approach that is distinct from examining patterns of care delivered by specific providers or facilities.

The hospital module is one of several different modules being created as part of the Population Health Information System, each of which is at a different stage of development:

Population Health: Health Status Indicators - To be released January, 1994
Socioeconomic Status and Health - To be released January, 1994
Utilization of Personal Care Home Resources - Released October, 1993
Utilization of Hospital Resources - Current document, to be released January, 1994
Utilization of Physician Resources - To be released February, 1994

Separate reports will be produced for each of the modules. Each report will be presented in two volumes: Volume I will present key findings and Volume II will contain a more detailed set of tables. The first reports of the Population Health Information System will have limited

distribution, primarily to obtain comment and feedback. Subsequent versions of the system will include several years of data to permit analysis over time and will be distributed to a wider audience.

1.2 Hospital Use Module

The Hospital Module of the Population Health Information System is being developed in two phases. The first, contained in Volumes I and II of this report, focuses on describing utilization of hospital services. The second phase will address cost implications of observed patterns of hospital use.

This report examines measures of need for medical care, overall use of hospital care, use of long stay and short stay inpatient care, issues of access, and patterns of care that contribute to differential utilization.

Several different perspectives are presented in the key findings. First, patterns of hospital care received by Winnipeg residents are compared and contrasted with patterns of care received by individuals who reside in other areas of the province (non-Winnipeg). Next, the analyses focus on comparing and contrasting patterns of care received by residents of the different Manitoba Health regions, with Winnipeg defined as a single region.

2. Methods

2.1 Analytic Approach

The major focus of analyses in the Population Health Information System is on describing patterns of health and medical care for residents of a defined area. For the hospital module, all hospital care received by individuals, whether it is received within or out of the region of residence, is attributed back to the area of residence. This population-based approach is fundamentally different from an analysis that focuses on patterns of care delivered by hospitals.

This module presents analyses that are intended to describe rather than explain different patterns of utilization of hospital resources. Because data in this report are presented without information about tests of statistical significance or confidence intervals, caution must be used in interpreting results.[1] However, parallel analyses conducted on 1990/91 data produced similar patterns, lending credibility to the findings.

The report analyses hospital abstracts submitted to Manitoba Health for the fiscal year 1991/92 by hospitals (both in and out of province) that provided services to Manitoba residents as defined by Manitoba Health.[2] Population counts are based on analysis of the Manitoba Health Registry as of December 31 of the 1991/92 fiscal year.[3] Numbers produced

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[1] From a statistical perspective, because the findings are based on the analysis of information from all units in the population (instead of a sample which collects information from only part of the population), they are not subject to sampling variability (Satin and Shasty, 1986). However, they may be affected by random variation from year to year, particularly where the number of events is small and the probability of such events is also small (National Center for Health Statistics, 1993), such as for admissions for long stay care.

[2] The definition of residents includes persons who reside temporarily out of the province (e.g. students attending post-secondary schools out of province) as well as Manitoba residents who have moved to another province (for two months after their move). In addition, new Manitobans arriving from another province (eligible for coverage immediately) are also included. Excluded from the analyses are: non-residents of Manitoba, armed forces personnel, federal penitentiary inmates and foreign students, for whom hospital abstracts are submitted when they obtain services from Manitoba hospitals.

[3] Thus newborns born after December 31, 1991 were not counted in population denominators, but were included in the service counts. Conversely, persons who died after December 31, 1991 were counted in the population denominators.

by the Manitoba Centre's registry file overcount Manitoba's population by 0.7 percent in comparison to figures produced by Manitoba Health, related to slightly different approaches to using information about changes in registry status.

Hospital data analyzed by the Centre are comparable to that compiled annually by Manitoba Health in the Annual Reports of the (formerly) Manitoba Health Services Commission. They include information about hospitalizations in both active treatment and extended treatment beds. As in Manitoba Health reports, some hospital services (e.g. newborn separations) are excluded. Our numbers differ slightly due to exclusion of hospitalizations for persons who were not resident in Manitoba and for contacts that did not fall within the fiscal year. In addition, we limited our analyses to inpatient and major surgical outpatient cases, thereby excluding 71,867 non-inpatient contacts which occurred for purposes other than major day surgery procedures.[4] Thus, the report is based on an analysis of 183,414 total hospital contacts for a population of 1,140,406 Manitoba residents.

Residents of Manitoba were identified and information about region of residence was obtained from the Manitoba Health registry file as at December 31, 1991, except for Treaty Status Indians.[5] For these individuals, residence information on the registry file may not be reliable because Manitoba Health assigns the region of residence as the First Nation of origin, usually a municipality denoted as an Indian reserve, instead of using actual residence information. Postal code information from hospital abstracts was therefore used to assign region of residence.

The numerator for rates was calculated by counting or summarizing events (i.e. hospitalizations) over the 1991/92 fiscal year for individuals identified as residents of a specified region. Denominators were based on counts of individuals resident in specified regions as per registry information as of December 31, 1991. Rates of the number of persons using hospital services, number of separations, number of episodes of hospital care and total

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[4] Hospitals provide a variety of clinical services on a non-inpatient basis, including contacts for 'not for admission' (NFA) and day surgery, day care, and day visits. Among this group of contacts, we identified contacts for surgical procedures that can alternately be performed on an inpatient or NFA basis (e.g. cataract surgery, hernia repair), which we labelled as 'major surgical outpatient' care. We excluded contacts for minor procedures (e.g. toenail removal, skin biopsy) and other services provided on a non-inpatient basis. Further details are provided in Section 2.2.

[5] The designation 'Treaty Status Indians' refers to a specific group of the aboriginal population who have certain rights and privileges under the Indian Act of Canada.

number of hospital days were developed by dividing numerator information by population denominators, measured in thousands. Rates were generally calculated using the total population as a denominator, but age- and sex-specific rates were also calculated, using information pertaining to the relevant age and sex categories for both numerator and denominator. Average length of stay was calculated by dividing total number of hospital days for residents of a given region for the fiscal year by total number of inpatient hospital separations during the same period.

In addition to crude rates, age- and sex-standardized rates of indicators were developed to permit comparisons across regions. The age and sex structure of the population of a region, together with differing needs for care, are factors recognized as contributing to different regional requirements for hospital resources, and hence as factors that ultimately influence patterns of care delivered. Unless otherwise indicated, rates presented in Volumes I and II of this report are adjusted or standardized rates. They have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization. This procedure mathematically removes the effects of different population structures in influencing rates of use of health care and produces 'synthetic' rates. These 'adjusted' rates provide an indication of the use of care in one region relative to use in another, after the effects of population structure have been removed.

2.2 Conceptual Issues

Hospital Separations

Typically, hospital separations represent the end point of an inpatient hospital contact which consists of several days of care. Hospital abstracts are also filed for activities which do not involve admission to hospital such as day surgery, administration of chemotherapy, and other activities. Technically, the number of admissions to hospital should be equivalent to the number of separations from hospital, but the lag time between admission and separation dates for inpatient care sometimes means that admissions and separations occur in different fiscal years, leading to minor differences between the two approaches to counting hospital contacts. Because hospital abstracts for inpatient care are based on information gathered at time of separation from the hospital, the analyses in this report are therefore based on separations. However, the words separation, discharge and stay are used interchangeably.

Classification of Hospital Care

Several terms are used to describe different subsets of hospital care considered in analyses in this report:

All hospital care refers to the complete data set of hospital contacts (183,414) considered for analysis. Of these, 151,444 were inpatient separations and 31,970 were contacts for major surgical outpatient procedures.[6] The analyses excluded 71,867 outpatient contacts which occurred for purposes other than major day surgery procedures.[7] Hospitals are not required to report on all non-inpatient activities and there is variation in the way they are recorded across hospitals, making them unreliable for analysis. In general, both inpatient and surgical outpatient contacts are included in analyses of 'all hospital care'; however day surgery contacts are excluded from calculations of length of stay.

Inpatient hospital care refers to all contacts in which patients had hospital stays of one or more days (151,444 separations). It has been further classified into: **short stay inpatient care**, comprising all separations with 1 to 59 days length of stay (147,817 separations); and **long stay inpatient care**, comprising all separations lasting 60 days or longer (3627 separations).[8] The term acute care is used interchangeably with the term short stay inpatient care.

Outpatient surgical care refers to the 31,970 contacts for major surgical outpatient procedures. These were defined as outpatient cases (day care with zero day length of stay) for surgical care recognized as falling into a surgical DRG category (Averill, 1991).[9] The

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[6] Hospitals provide a variety of clinical services on a non-inpatient basis, including contacts for 'not for admission' (NFA) and day surgery, day care, and day visits. Among this group of contacts, we identified contacts for surgical procedures that can alternately be performed on an inpatient or NFA basis (e.g. cataract surgery, hernia repair), which we labelled as 'major surgical outpatient' care.

[7] The 71,867 excluded contacts comprise minor elective surgical or endoscopic procedures (e.g. toenail removal, skin biopsy) and other services such as day care and day visits provided on a non-inpatient basis. It is estimated that the total number of outpatient contacts probably exceeds 400,000 annually (Toll, personal communication, 1993), but only certain types of care must be reported to Manitoba Health (Appendix G, Hospital Abstract User Manual, 1987).

[8] The first 59 days of a long stay admission are included in the long stay rather than the short stay analyses.

[9] The DRG program classifies hospital care into homogenous groups with respect to clinical and resource consumption and is used as a tool to pay hospitals for care provided in the United States. Since having a surgical procedure is one of the major factors contributing to higher resource use (costs)

outpatient surgical care category includes adult, pediatric and obstetrical outpatient day surgical cases (see Type of Care, below).

Types of Rates Calculated

Rates of several different parameters were developed to profile different aspects of hospital utilization. The population-based parameters are expressed as rates per 1000 residents (per year) and may be presented as either crude or adjusted rates. They count events for residents of given regions, regardless of where the event takes place, so hospitalizations occurring in Winnipeg for residents of Thompson are attributed back to the Thompson region.

Number of persons hospitalized counts the number of unique residents who have had contact with the hospital system (i.e. an individual who has had one or more hospital separations is counted only once, regardless of the number of separations). This measure provides a useful indicator of the ability of people in one region or another to receive hospital care, comparisons of which are useful for consideration of issues of access and equity across regions.

Number of separations counts the number of hospital contacts (i.e. separations or outpatient contacts) for any given region. It is a function of both the rate of persons hospitalized (above) and the average number of times they are hospitalized; it is the most commonly used measure of hospital utilization.

Number of episodes of hospital care counts the number of hospital separations that represent an initiation of use of hospital care (i.e. an additional separation resulting from a transfer of a patient between hospitals is not counted). This measure adjusts for bias introduced by double counting separations for patients who are transferred from one hospital to another to receive appropriate care, which contributes to higher measured rates of hospital contacts for residents living outside of Winnipeg.

Number of days of hospital care counts the total number of days of hospital care used by all residents of a given region. This measure is a function of the number of

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during a hospital stay, the program partitions care into surgical and nonsurgical care. It therefore permits identification of hospitalizations involving surgery, for either inpatient or outpatient care.

separations and the average length of stay. It provides a useful estimate of the total resources used to provide inpatient hospital care to residents of one region versus another.

Length of stay measures the average number of days of care for inpatient hospitalizations for residents of a given region. Zero day stays for surgical outpatient care are therefore not included in the calculation. This measure has been used to assess hospital efficiency, after controlling for factors such as severity of cases (Brownell and Roos, 1992). It is not a population-based measure because the denominator is the number of hospitalizations; consequently it has not been age- and sex-adjusted in the analyses.

Region of Residence

Analyses are oriented to describing differing patterns of hospital utilization by residents of the eight regions defined by Manitoba Health: Central, Eastman, Interlake, Norman, Parklands, Thompson, Westman, and Winnipeg. For comparative purposes, summary data for two other regions, the province and an aggregate of all non-Winnipeg regions, are also presented. For ease of reference, the non-Winnipeg region is sometimes referred to as a rural region in comparisons between Winnipeg and non-Winnipeg regions.

Bed Supply

Manitoba Health publishes information about the supply of hospital beds located in each region, expressed as beds per region and beds per 1000 population (Manitoba Health Services Commission Annual Report 1991/92). The latter is referred to in this report as **actual bed supply**. This measure does not account for hospital beds located in other regions, particularly Winnipeg, that are used by residents of a given region.[10] It therefore underestimates beds available to and used by regions outside of Winnipeg, while overestimating beds available to residents of the Winnipeg region. To eliminate this bias, a measure of **effective bed supply** (i.e. effective number of hospital beds per 1000 residents) was developed, in which Winnipeg beds were added for each rural region, proportional to their use. Conversely, the effective bed supply for Winnipeg residents was reduced in proportion to use of Winnipeg beds by non-Winnipeg residents. Bed supply ratios have not been age- and sex-adjusted.

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[10] In 1991/92, 19.5 percent of Winnipeg hospital beds were used by non-Winnipeg residents (Manitoba Health Services Commission Annual Report, 1991/92); 16.4 percent were used by residents of non-Winnipeg regions and 3.1 percent were used by persons who reside outside of Manitoba.

Indicators of Need

While age- and sex- adjustment removes the effects of population structure, it does not adjust for need. Adjusted rates of hospital utilization must therefore be considered in light of the relative 'need' for medical care across regions. Two indicators of need are presented in this report. The first is an index of socioeconomic risk developed for the Socioeconomic Status and Health module of the Population Health Information System (Frohlich and Mustard, 1993). Measures of socioeconomic status capture preconditions that place individuals at risk of poor health and therefore may identify their relative need for various types of medical care. They have been shown in Canada and elsewhere to be strongly related to poor health and to higher rates of use of hospital care (Carstairs and Morris, 1991; MacMahon et al., 1992). The indicator developed by Frohlich and Mustard is referred to as the **Socioeconomic Risk Index**. It comprises six regional indicators derived from census data.[11]

The second indicator is the mortality rate for ages 0 to 64 years, adjusted to the provincial population and indexed to the provincial rate, referred to as the **Standardized Mortality Ratio (0-64 Year)**. It was developed for the Population Health: Health Status Indicators module of the Population Health Information System (Cohen and MacWilliam, 1993). This measure has been seen by many as the most valid and practical indicator of health status capturing the need for health care (Palmer et al. 1979) and has been proposed for needs-based funding of regional health services in Ontario (Eyles et al. 1991; Birch and Chambers 1993; Eyles and Birch 1993). While using death rates to determine need for hospital care seems counterintuitive, the measure is strongly associated with indicators of morbidity and socioeconomic status. Furthermore, it is known that a large amount of hospital care is used in the period just prior to death.

2.3 Indicators of Differential Utilization

Utilization rates were categorized in several ways to describe differences in the way hospital care is used across regions. For comparisons by age and sex category, age- and sex-specific rates were calculated. For other comparisons, utilization rates were partitioned into categories

[11] The six indicators are: 1) percentage of the population between the ages of 25 and 34 having graduated from high school; 2) percentage of the labour force between 15 and 24 years of age that is unemployed; 3) percentage of the labour force between 45 and 54 years that is unemployed; 4) percentage of single parent female households; 5) percentage of female labour force participation; and 6) average dwelling value.

pertaining to patient comorbidity, type of care, and other factors. Because rates for each category were calculated using the total population as the denominator, the categories for each partition sum to the total utilization rate. Consequently, the percentage of a region's total utilization by any one category of care may be described. Description of the concepts and categories used are outlined below.

Age and Sex

Rates of hospital care were subdivided into age and sex categories to compare patterns across regions. For short stay care, ages 0 to 14, 15 to 64, 65 to 74, and 75 and over were examined separately for males and females. For long stay care the age categories were: 0 to 64 years, 65 to 74 years, and 75 years and older. Age- and sex-specific rates are crude rates (i.e. not age- and sex- adjusted) and are calculated using the relevant age- and sex-specific population as the denominator. Because the denominator for each category is not the total population, the rates may be used for direct comparison but cannot be summed.

Patient Comorbidity

Comorbidity refers to medical conditions that exist in addition to the most significant condition which causes a patient's stay in hospital. The type and number of comorbid conditions provide an indication of the health status (and risk of death) of patients (Charlson et al. 1986). We used counts of comorbid conditions identified by Charlson in order to classify hospital cases by number of comorbid conditions. Cases (patients) were classified as having none, one, two, or three or more, of the comorbid conditions known to increase risk of death.

Level of comorbidity and complications

Comorbidity, together with complications of care, affect the complexity of hospital care required to treat given patients. The RDRG (Refined DRG) program (Fetter and Freeman, 1989) is an alternate version of the DRG program. In addition to classifying cases into related clinical groups, it also classifies them according to patterns of comorbidity and complications of care that are likely to have an impact on use of hospital resources. We used the RDRG program to classify patients into three groups of complexity: those where comorbidity and complications were likely to have no or only minor impact on hospital resource use; those in which comorbidity and complications were likely to have a moderate impact; and those where comorbidity and complications were likely to have a major impact.

The final category also included a catastrophic category for surgical cases, where, for instance, a patient had an acute myocardial infarction while undergoing surgery.

Location of Care Received

Rates of care received by regional residents have been categorized in two ways to characterize the location where hospital care is received. In some analyses, care has been classified by whether it was received 'in province versus out of province'. In other analyses, to better understand the dynamics of intraprovincial travel for care, rates of care have been categorized into: care that is obtained within the region of residence; care that is obtained outside the region of residence, in Winnipeg; and care that is received outside the region of residence in a region other than Winnipeg.

Level of Care Received

Hospitals in Manitoba range from small institutions, having less than 15 beds, to large urban teaching hospitals with hundreds of beds and a capacity to provide very specialized services. Use of one type of hospital instead of another has implications for the availability of specialized services, distance a patient must travel for care, and resource costs of providing care. Hospitals were grouped according to their similarities (in terms of size, level of specialization, and environment) in order to permit analyses of the relative rates of use of different levels of hospital care. Seven levels of hospital were defined (teaching, urban community,[12] major rural, intermediate rural, small rural, small multi-use,[13] northern isolated) in addition to other categories, including: institutions that function as personal care homes,[14] chronic and rehabilitation institutions,[15] Federal nursing stations,[16] and out of

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[12] Urban community hospitals include the five Winnipeg community hospitals as well as Brandon General Hospital.

[13] Small, multi-use facilities are those that have, in addition to regular hospital beds, swing beds that can provide either hospital or personal care home services. This category included Benito, MacGregor-North Norfolk, Manitou-Pembina, Reston, Rossburn, and Whitemouth hospitals.

[14] Three hospitals in the province, with a total of 27 beds, function as nursing homes but are not accredited as same.

[15] This includes institutions that have major chronic and rehabilitation functions: the Deer Lodge Hospital, the Winnipeg Municipal Hospitals, the Rehabilitation Centre for Children and the Manitoba Adolescent Treatment Centre. In contrast, extended treatment beds located in institutions that function primarily as active treatment centres (i.e. Brandon, Dauphin, Morden, Portage, St. Boniface, Steinbach and Swan River) are included in the level of care category of the primary institution.

province facilities. These categories have been aggregated for presentation in graphs and tables. Classification of specific hospitals, as well as information about number of beds and interprovincial per diem rates is provided in Appendix A.

Length of Stay

Hospital stays were grouped into eight length of stay categories: 1 to 8 days, 9 to 14 days, 15 to 22 days, 23 to 59 days, 60 to 89 days, 90 to 179 days, 180 to 365 days, and 365 days and over. The first four categories were used to analyze short stay care (1-59 days), while the latter four were used to analyze long stay care (60+ days).

Type of care

Among inpatient services, several types of care were differentiated, reflecting clinical categories of care: adult surgical, adult medical, obstetric, psychiatric, and pediatric (including both medical and surgical) services. In these analyses, adult surgical care refers only to inpatient care; it does not include adult surgical care provided in day surgery settings. Because hospital abstracts for psychiatric care are not submitted to Manitoba Health by several relevant institutions - the Eden Mental Health Centre, Selkirk Mental Health Centre, and Brandon Mental Health Centre - analyses of psychiatric care systematically underreport utilization by residents of some regions, and must be interpreted accordingly.

Intensity of Resource Use

Resources used to provide hospital care vary across cases.[17] We used DRG weights[18] to classify hospital care into three levels of intensity of resource use. First, each hospital contact was assigned a DRG weight and all cases were ranked from lowest to highest intensity of resource use. Three levels were defined to classify rates of hospital care received by regional residents: the lowest ten percent of cases - including stays for false labour, pediatric

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[16] Federal nursing stations report through the hospital abstract system but Provincial nursing stations report their activities through an alternate mechanism. Inpatient care delivered by Provincial nursing stations (5 in Norman region and 3 in Thompson region) is therefore not captured in the dataset.

[17] Resources used by hospitals include labour and non-labour inputs such as drugs, equipment, food and fuel. Resource inputs vary in terms of price, volume and mix (Black and Frohlich, 1991).

[18] DRG weights describe resource use for different types of care in relation to an arbitrarily defined standard case. While they were developed exclusively with United States cost data, they correlate well with similar intensity weights (CMG) developed from U.S. data for Canadian applications.

tonsillectomy and/or adenoidectomy, and other care requiring few resources - were classified as very low intensity; the highest five percent of cases, which used 11.5 percent of hospital days and included separations for coronary artery bypass procedures, craniotomy and other major cases requiring intense hospital treatment, were called very high intensity care; the remaining cases were classified as intermediate in resource intensity.

Discretionary Nature of Services

Increasingly, it is recognized that requirements for hospital care are not clearly defined and that, among different population groups, different rates of hospital care are explained not only by differing needs for care but also by a population's socioeconomic status, by the availability of hospital beds and by differing judgements about requirements for hospital care among clinicians (Wennberg, Freeman and Culp, 1987). Wennberg and others (1989) have characterized cases by the degree of variation in rates of hospital admission that they exhibit across population groups. Admission rates for certain medical conditions show the greatest variability, followed by pediatric admissions and those for minor surgery. By contrast, rates for major surgery and for certain other conditions (which tend to reflect incidence of the disease) show very little variability. Wennberg has suggested that conditions for which there is marked variation are likely to represent care in which physician discretion plays a role. In contrast, others contend that some of the observed variation is related to socioeconomic risk (McLaughlin et al. 1989; McMahon et al. 1991; McMahon et al. 1993) and other factors such as geographic isolation and lack of alternatives to hospital care. Based on Wennberg's work, we defined the following categories of inpatient hospital care:

High variation medical conditions are those conditions, such as pneumonia, gastroenteritis and chronic obstructive lung disease, for which highly variable admission rates have been consistently demonstrated. These conditions represent more than 80 percent of medical admissions to hospital (Wennberg, 1986). In these analyses, they include both pediatric and adult admissions.

Surgical conditions include both pediatric and adult surgical inpatient (but not outpatient) surgical cases that, as a group, typically show less variability than high variation medical conditions defined above. Examples include admissions for cholecystectomy and appendectomy.

Low variation conditions include medical and surgical conditions which demonstrate relatively stable rates across populations. They include admissions for heart attack, hip fracture and colon cancer surgery, for which there is little clinical ambiguity about the need for hospitalization.

Indicators of Access to Hospital Services

Access has been measured with indicators of utilization that are likely to illustrate deficiencies in individuals' ability to obtain certain types of hospital care, presented as rates of persons who receive care. Patterns of use of newer technology, relatively scarce interventions, and innovations in care delivery (such as day surgery) are important access issues in a province which fully insures medical care but has a concentration of services in one location, namely Winnipeg. We analyzed rates of use of very high intensity care, rates of care received in more technologically sophisticated teaching and urban hospitals, and rates of use of inpatient and outpatient surgical procedures to provide insight into issues of access.

3. Key Findings

3.1 Indicators of Need

Rankings of the eight regions from lowest to highest need were similar for both the Socioeconomic Risk Index and the Standardized Mortality Ratio (0-64 Year) (Figure 1). Both indicators assessed residents of Winnipeg, Westman and Central regions to be in positions of low need relative to other regions, although they ordered them differently. Both indicators then ranked Eastman, Interlake, Parklands, Norman and Thompson in order of increasing need.

Values of the Standardized Mortality Ratio (0-64 Year) for Norman and Thompson were significantly higher than the provincial mean ($p < .01$), consistent with a greater need for medical care than the province in general (Cohen and MacWilliam, 1993). Westman's value was lower than the provincial mean, although not statistically significant. The other regions had values close to the provincial average. A comparison of the non-Winnipeg and Winnipeg regions showed no significant difference, indicating that overall, these two regions have similar needs.

Key Findings: Figure 1

Indicators of need for medical care by region

Figure 1.1 Socioeconomic risk index

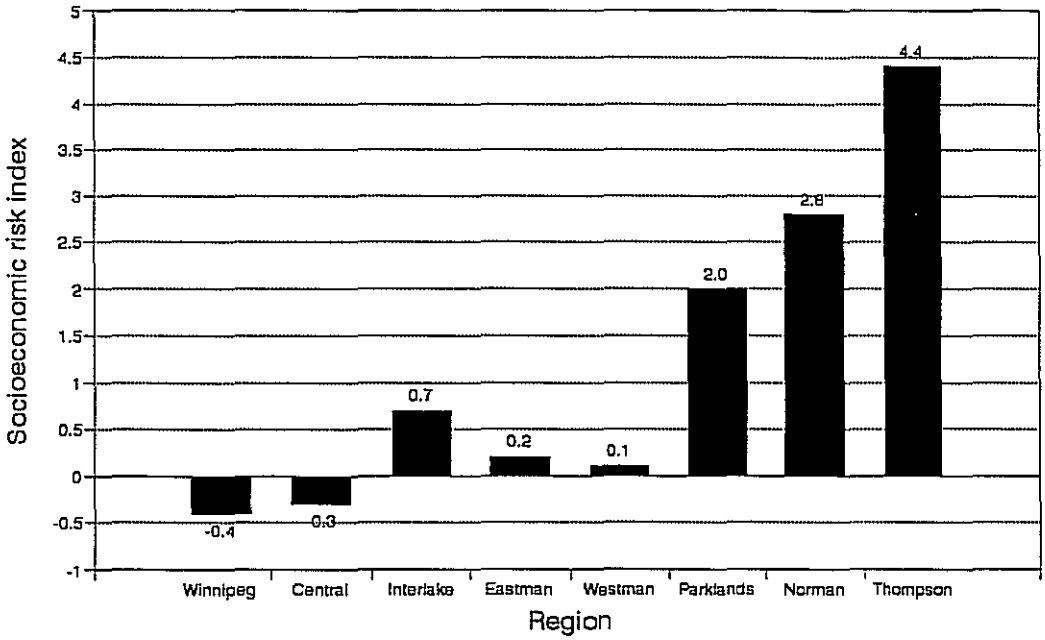
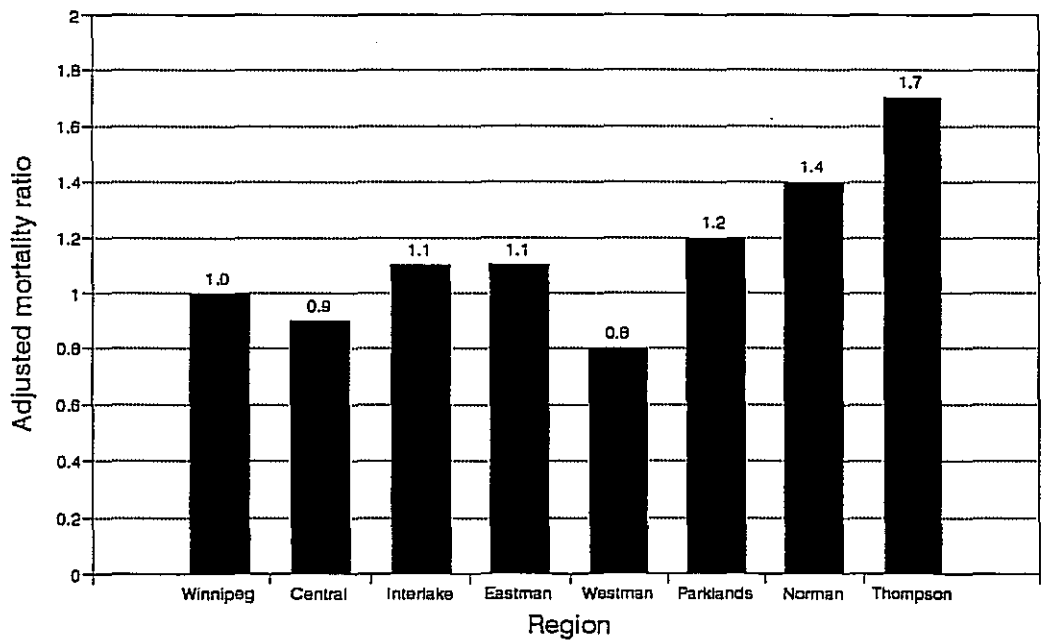


Figure 1.2 0-64 year adjusted mortality ratio



3.2 General Findings

Comparison of Crude to Adjusted Rates

Age- and sex- adjustment yields 'synthetic' rates that may differ considerably from crude (actual) utilization rates (Figure 2). Adjustment changes a region's rate to what it would be, assuming it had a population similar to that of Manitoba as a whole. Therefore, for regions with population structures similar to that of the province (Winnipeg and Interlake), age- and sex- adjustment of rates made very little difference.

Some regions, notably Central, Westman and Parklands, have a high proportion of elderly persons. Because the elderly use more hospital care relative to persons in younger age groups, in these regions adjustment had the effect of reducing the adjusted rate in comparison to the crude rate.

In contrast, for regions with very young population structures (Eastman, Norman and Thompson), adjustment produced higher rates than crude rates. Thus, while Thompson residents actually used fewer days per capita than any other region, when the rate was adjusted to remove the effects of their very young population structure, Thompson residents actually had the highest relative rate of use of inpatient care.

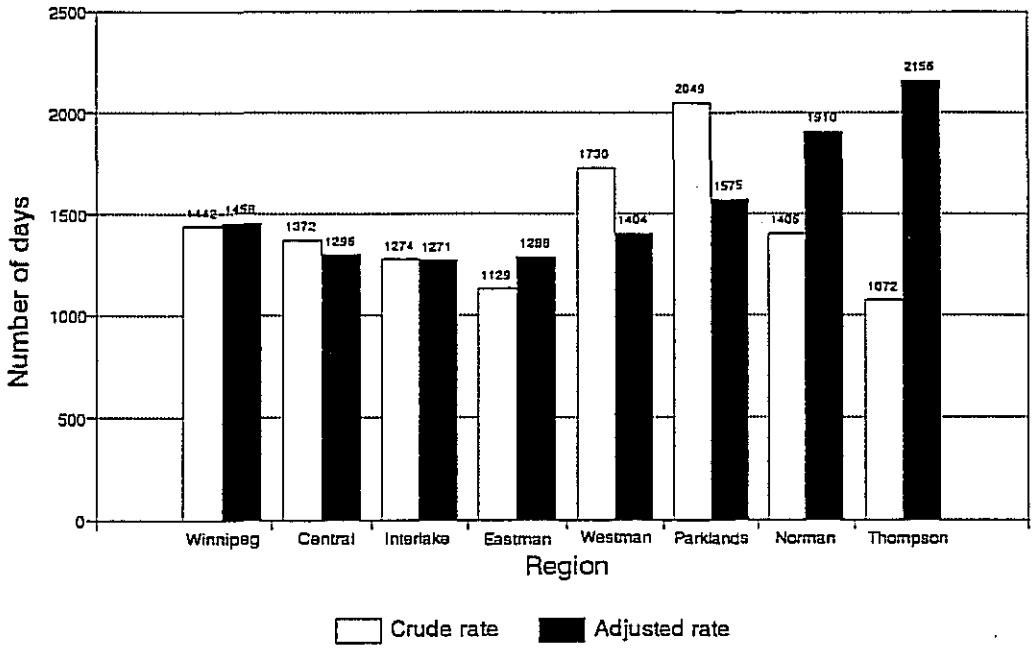
Comparison of Separations and Episodes of Care

Measures of episodes of hospital care, which remove the effects of patient transfers, were by definition lower than separations for all regions (Figure 3). Comparisons of the two measures showed a differential impact across regions, with the smallest impact for Winnipeg residents (2.2 percent reduction in measured utilization rate). There was a larger differential for non-Winnipeg regions, where residents have a greater likelihood of being transferred for hospital care. The largest effect was for Thompson residents, where the episode measure reduced the utilization rate by 11.2 percent.

Overall, however, the episode of care measure did not change the ranking of regions in their measured utilization. For this reason, the more traditional measure of separations is used in this report to describe patterns of hospital use.

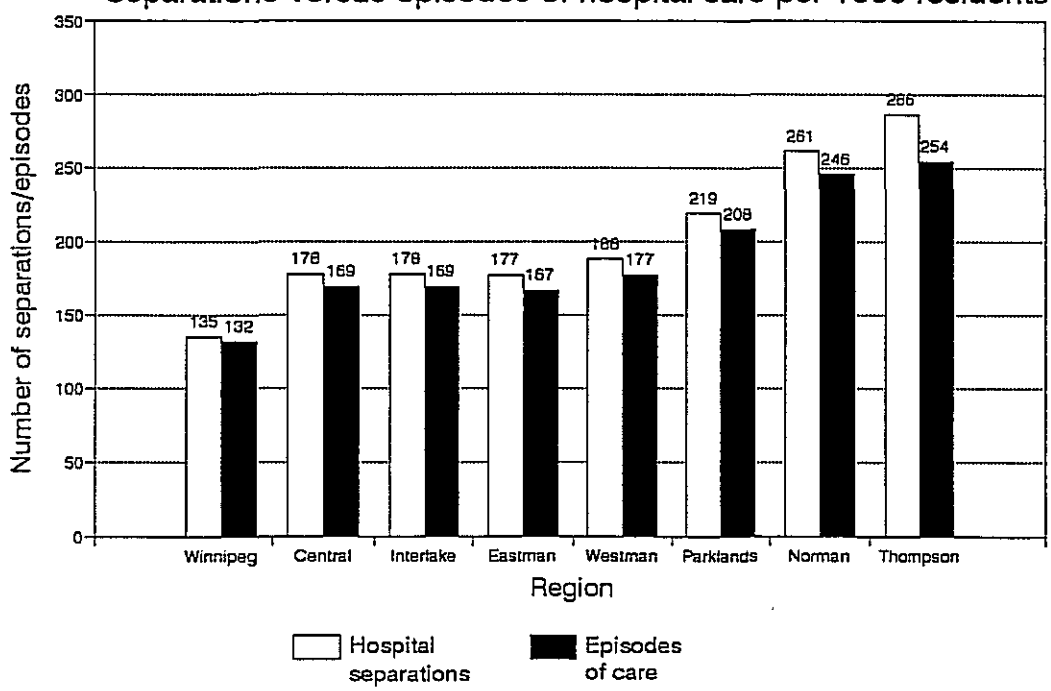
Key Findings: Figure 2

Inpatient hospital care
Crude versus adjusted number of days of care per 1000 residents



Key Findings: Figure 3

All hospital care
Separations versus episodes of hospital care per 1000 residents



3.3 Non-Winnipeg to Winnipeg Comparisons

Use of All Hospital Care

Non-Winnipeg residents had an effective bed supply 25 percent higher than that available to Winnipeg residents and were 30 percent more likely to have a hospital contact (Table 1). The rate of hospital separations for rural residents was fully 45 percent higher than the rate for Winnipeg residents. This differential was reduced only slightly when transfers for rural Manitobans (often to Winnipeg hospitals) were factored out by examining episodes of hospital care: rural residents still received 40 percent more hospitalizations by this measure of use. Rural residents had much shorter hospital stays, however, with an average length of stay for inpatient care that was 30 percent lower than that for Winnipeg residents. A higher rate of separation combined with a shorter average length of stay resulted in a slightly lower overall use of hospital days for rural residents: 1415 per 1000 residents compared to 1461 for Winnipeg residents.

Use of Short versus Long Stay Care

Analysis of rates of hospital care by length of stay reveals that Winnipeg and non-Winnipeg regions had fundamentally different patterns of using hospital care (Tables 2 and 3; Figure 4). Non-Winnipeg residents received considerably more separations and days of hospital care for short stay care than did Winnipeg residents. In particular, they received 79 percent more hospitalizations for stays lasting one to eight days. Overall for short stays, they had rates of separation that were 66 percent higher and rates of use of hospital days that were 37 percent higher than Winnipeg residents, in spite of having a lower average length of stay.

Rural residents' higher separation rate disappeared for stays 60 days and over. For these stays, in spite of roughly similar rates of separation, Winnipeg residents spent considerably more days in long stay hospitalizations than did rural residents (i.e. 28 percent higher for stays of 60 to 89 days; 41 percent higher for stays of 90 to 179 days; 74 percent higher for stays of 180 to 365 days; and 149 percent higher for stays of over one year).

Looking at all long stay care (Table 3), Winnipeg residents were much more likely to have a long hospital stay and had rates of hospitalization 48 percent higher (i.e. 3.7 versus 2.5 separations per 1000 residents) than non-Winnipeg residents. Average lengths of stay were 23

Key Findings: Table 1

Rates[1] of Use of All Hospital Care[2] by Non-Winnipeg and Winnipeg Residents

	Non-Winnipeg Residents	Winnipeg Residents	Ratio: Non-Winnipeg to Winnipeg[3]
Effective number of hospital beds per 1000 residents[4]	6.4	5.1	1.25
Persons hospitalized per 1000 residents	130	100	1.30
Episodes of hospital care[5] per 1000 residents	185	132	1.40
Hospital separations per 1000 residents	196	135	1.45
Average length of stay[6]	8.5	13.7	0.70
Hospital days per 1000 residents	1,415	1,461	0.97

[1] Population-based rates (i.e. those measuring events per 1000 residents) have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

[2] All hospital care refers to the complete set of hospital contacts (183,414) considered for analysis. Of these, 151,444 were inpatient admissions and 31,970 were major day surgery contacts. The analyses excluded outpatient contacts which occurred for purposes other than major surgery procedures.

[3] Ratios of non-Winnipeg to Winnipeg rates were calculated from numbers rounded to 2 decimal places and hence may differ slightly from what would be calculated using numbers in the table.

[4] Based on patterns of use described in Table 3 of the Manitoba Health Services Commission Annual Report 1991-92 and additional information from Manitoba Health, the 3,139 active treatment beds located in Winnipeg were allocated in the following manner: 2,527 (80.5 percent) to Winnipeg residents; 515 (16.4 percent) to rural residents and 97 (3.1 percent) to non-residents. This produced a total of 3,150 effective active and extended treatment beds available to non-Winnipeg residents and 3,142 active and extended treatment beds available to Winnipeg residents.

[5] An episode of hospital care represents continuous use of hospital care that may include one or more transfers between facilities.

[6] Average length of stay is calculated for inpatient admissions only; outpatient contacts for major day surgery procedures are excluded from the analysis.

Key Findings: Table 2

Rates[1] of Use of All Hospital Care[2] by Non-Winnipeg and Winnipeg Residents by Length of Stay

Length of stay	Admissions per 1000 residents: Non-Winnipeg Residents	Winnipeg Residents	Ratio: Non-Wpg to Winnipeg[3]	Days per 1000 residents: Non-Winnipeg Residents	Winnipeg Residents	Ratio: Non-Wpg to Winnipeg[3]
0 days[4]	26	30	0.87	0	0	N/A
1-8 days	136	76	1.79	454	258	1.76
9-14 days	17	12	1.42	192	133	1.44
15-22 days	8	6	1.33	139	112	1.24
23-59 days	7	7	1.00	232	241	0.96
60-89 days	1	1	--	78	100	0.78
90-179 days	1	1	--	104	147	0.71
180-365 days	<1	1	--	101	176	0.57
>365 days	<1	<1	--	119	296	0.40
Overall[5]	196	135	1.45	1,415	1,461	0.97

[1] Rates have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

[2] All hospital care refers to the complete set of hospital contacts (183,414) considered for analysis. Of these, 151,444 were inpatient admissions and 31,970 were day surgery contacts. The analyses excluded 71,867 outpatient contacts which occurred for purposes other than major day surgery procedures.

[3] Ratios of non-Winnipeg to Winnipeg rates were calculated from numbers rounded to 2 decimal places and hence may differ slightly from what would be calculated using numbers in the table.

[4] Zero day stays refer to the 31,970 outpatient contacts for major day surgery procedures.

[5] Due to rounding, column totals may not equal overall totals.

Key Findings: Table 3

Rates[1] of Use of Inpatient Short Stay[2] Versus Long Stay[3] Care by Non-Winnipeg and Winnipeg Residents

	Long Stay Inpatient Care (60+ days)			Short Stay Inpatient Care (<60 days)		
	Non-Winnipeg Residents	Winnipeg Residents	Ratio: Non-Winnipeg to Winnipeg[4]	Non-Winnipeg Residents	Winnipeg Residents	Ratio: Non-Winnipeg to Winnipeg[4]
Persons hospitalized per 1000 residents	2.4	3.5	0.68	110	75	1.47
Episodes of hospital care[5] per 1000 residents	N/A	N/A	N/A	157	99	1.59
Hospital separations per 1000 residents	2.5	3.7	0.69	168	101	1.66
Average length of stay	159	195	0.82	6.1	7.3	0.84
Hospital days per 1000 residents	402	719	0.56	1,016	743	1.37

[1] Population-based rates (i.e. those measuring events per 1000 residents) have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

[2] Short stay inpatient care refers to the 147,817 admissions with lengths of stay ranging from 1 to 59 days.

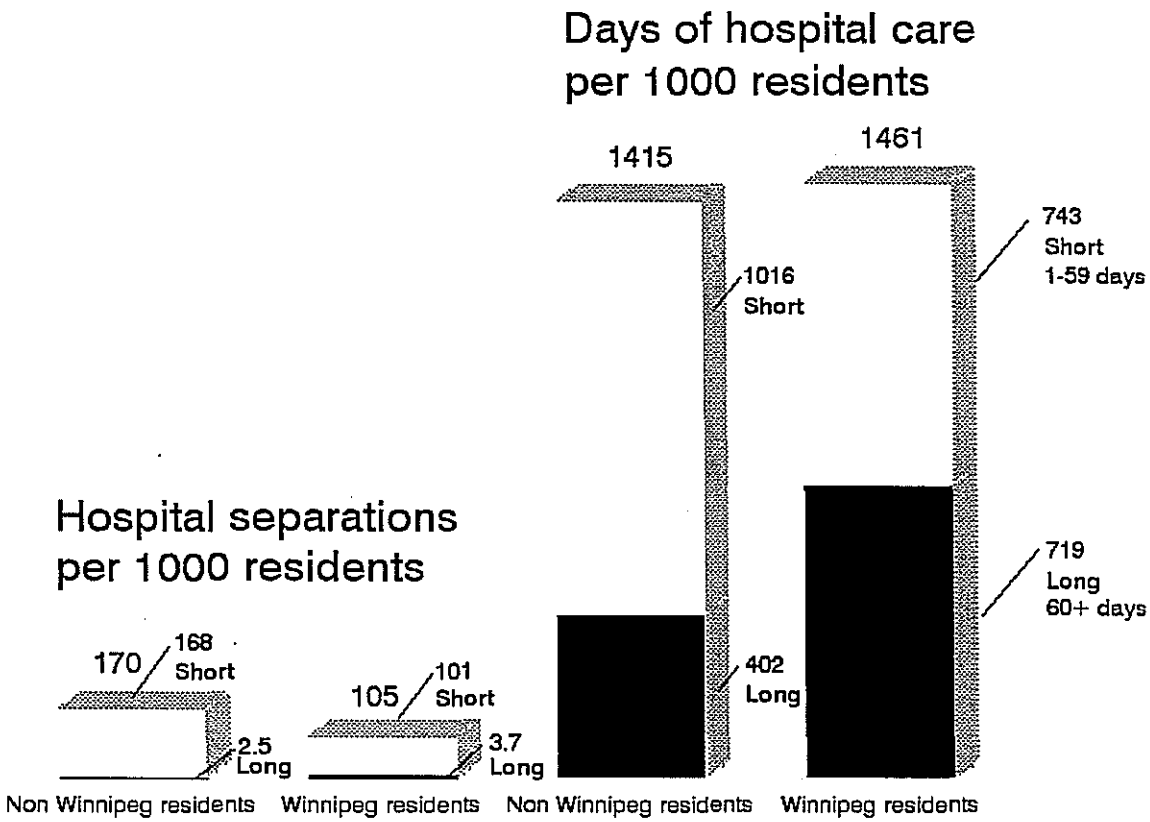
[3] Long stay inpatient care refers to the 3627 admissions lasting 60 days or longer.

[4] Ratios of non-Winnipeg to Winnipeg rates were calculated from numbers rounded to 2 decimal places and hence may differ slightly from what would be calculated using numbers in the table.

[5] An episode of hospital care represents continuous use of hospital care that may include one or more transfers between facilities.

Key Findings: Figure 4

Comparative rates of use of inpatient short stay versus long stay care by non Winnipeg and Winnipeg residents



percent longer and total hospital days per 1000 residents were 79 percent higher than for rural residents.

Impact of Patterns of Use of Long Stay Inpatient Care

The impact of high rates of long stay care on hospital resources is significant. For Winnipeg residents, while only 4 percent of inpatient separations were for long stay hospital care, 49 percent of their hospital days were devoted to long stay hospital care (Figure 4). For rural residents, 2 percent of inpatient separations for long stay care accounted for 28 percent of the hospital days they received. Thus, while large portions of hospital resources were devoted to provision of long stay hospital care, Winnipeg residents had much higher adjusted rates of long stay hospital care than rural residents. Since Winnipeg residents represent 57 percent of the provincial population, their high utilization of long stay hospital days has a major impact on use of provincial hospital resources.

Patterns of Differential Utilization of Long Stay Care

Fully 41 percent of Winnipeg residents' adjusted rates of long stay days were spent in stays of one year or more, compared with 30 percent for rural Manitobans. In fact, Winnipeg residents used more hospital days for stays lasting over one year than they did for very short hospitalizations lasting only one to eight days (Table 2).

Other differences in patterns of long stay care are also evident (Table 4). Days used per 1000 residents were higher for Winnipeg residents across all age and sex categories, but were particularly high for males in the 0 to 64 year age group (2.8 times higher). This may relate to trauma in this age group, resulting in patients being transferred to Winnipeg for complex care.

Neither Winnipeg nor rural residents received a majority of long stay care in chronic hospitals: 28 percent and 7 percent of long stay days, respectively. Winnipeg residents received 36 percent of their days of long stay care in teaching hospitals and 34 percent of long stay days in urban community hospitals, compared with rates of 11 and 20 percent for rural residents. Most of rural Manitobans' long stay days were spent in hospitals in their home region. However, approximately 31 percent of their long stay days were spent in Winnipeg hospitals.

Key Findings: Table 4

Patterns of Use of Long Stay Inpatient Care[1] by Non-Winnipeg and Winnipeg Residents

		Number of days of care per 1000 residents[2]		
		Non-Winnipeg Residents	Winnipeg Residents	Ratio: Winnipeg to Non-Winnipeg[3]
By age and sex of residents:[4]				
Males	0-64	82	227	2.8
	65-74	758	1,803	2.4
	75+	3,808	7,796	2.0
Females	0-64	88	161	1.8
	65-74	799	1,497	1.9
	75+	5,284	7,321	1.4
Level of care[5]				
Teaching hospital		44	258	5.9
Urban community hospital		79	245	3.1
Major rural hospital		122	4	<0.1
Other rural hospital		123	8	<0.1
Chronic hospital		28	201	7.2
Out of province hospital		1	1	1.0
Location of care[6]				
In region of residence		320	705	2.2
Out of region: Wpg		76	N/A	N/A
Out of region: not Wpg		7	15	2.1
Total[7]		402	719	1.8

[1] Long stay inpatient care refers to the 3627 admissions lasting 60 days or longer.

[2] All rates except age- and sex-specific rates (i.e. rates by age and sex of residents) have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

[3] Ratios of Winnipeg to non-Winnipeg rates were calculated from numbers rounded to 2 decimal places and hence may differ slightly from what would be calculated using numbers in the table.

[4] Age- and sex-specific rates are crude rates (i.e. not age- and sex-adjusted) and are calculated using the relevant age- and sex-specific population as the denominator. Because the denominator for each category is not the total population, the rates may be used for direct comparison but cannot be summed.

[5] Hospitals were grouped according to size, level of specialization, and environment to permit analyses of use of different types of hospital. Further details are given in Section 2.2 and Appendix A.

[6] Location of care refers to the site of care delivery in relation to patient region of residence.

[7] Due to rounding, column totals may not equal overall totals for level of care and location of care.

Patterns of Differential Utilization of Short Stay Care

Overall, rural residents used 36.7 percent more days of short stay care than Winnipeg residents. In considering issues of severity of patient illness (Table 5), rates of use were slightly lower for non-Winnipeg patients who were very ill (i.e. with 3 or more comorbid conditions) or who required complex care (i.e. with high level of comorbidity and complications that affect resource utilization) when compared to Winnipeg residents. The largest differences in use between rural and urban populations were for care for patients who were less severely ill or required less complex care. Specifically, non-Winnipegers had a 50 percent higher rate of use of hospital days for cases with no comorbid conditions and a 68 percent higher rate for cases assessed as having a low complexity score.[19]

Non-Winnipeg residents also had only slightly lower rates of use of very high intensity days of care than did Winnipeg residents. The largest differential in rural utilization was for care of very low intensity (rural residents used 63 percent more days of care), followed by care of intermediate intensity (40 percent more days used). Rural residents received only 10 percent fewer days of care of very high intensity, in spite of receiving 42 percent fewer days in teaching hospitals. Whereas Winnipeg residents received almost all of their hospital days (92 percent) at more sophisticated urban hospitals, non-Winnipeg residents received only 39 percent of their days at this level of care; they received 27 percent of their care at large rural hospitals and 33 percent of their care at smaller rural facilities.

Rural residents had much higher rates of use of hospital days for medical (65 percent higher) and pediatric (114 percent higher) care than did Winnipeg residents. In terms of Wennberg's discretionary care categories, they used more days per 1000 residents for high variation medical conditions (58 percent more), but equivalent days for surgical and low variation conditions.

Overall, the greater use of short stay hospital days by rural residents in relation to Winnipeg residents was accounted for by higher use for patients who had less complex medical conditions and were less severely ill, for care that was less intensive, for separations with very short stays, and for medical diagnoses for which, as Wennberg suggests, there is an

[19] These analyses are somewhat confounded by the fact that they are based on the recording of secondary diagnoses. In general, rural hospitals tend to record fewer diagnoses than do urban hospitals, which might influence rates of care for rural residents.

Key Findings: Table 5

Patterns of Differential Utilization of Short Stay Inpatient Care[1] by Non-Winnipeg and Winnipeg Residents

Number of days of hospital care per 1000 residents[2] by:	Non-Winnipeg Residents	Winnipeg Residents	Ratio: Non-Winnipeg to Winnipeg[3]
Number of comorbid conditions[4]			
None	695	462	1.5
1	141	115	1.2
2	105	78	1.3
3+	76	89	0.9
Level of comorbidity and complications[5]			
Low	638	379	1.7
Moderate	249	210	1.2
High	132	155	0.9
Intensity of care[6]			
Very low	93	57	1.6
Intermediate	830	583	1.4
Very high	94	103	0.9
Level of care[7]			
Teaching hospital	198	340	0.6
Urban community hospital	195	345	0.6
Large rural hospital	270	6	45.0
Other rural	348	49	7.1

[1] Short stay inpatient care refers to the 147,817 admissions with lengths of stay ranging from 1 to 59 days.

[2] Rates have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

[3] Ratios of non-Winnipeg to Winnipeg rates were calculated from numbers rounded to 2 decimal places and hance may differ slightly from what would be calculated using numbers in the table.

[4] Comorbidity refers to medical conditions that exist in addition to the main reason for hospitalization; the type and number of comorbid conditions provide an indication of patients' health status and risk of death (Charlson et al. 1986).

[5] Comorbidity and complications affect the complexity of hospital care and the resources required to treat given patients. The RDRG program was used to classify patients into three groups based on their expected resource use.

[6] DRG weights were used to classify cases according to their intensity of resource use: the lowest ten percent of cases, the highest five percent of cases, with remaining cases classified as intermediate.

[7] Hospitals were grouped according to their size, level of specialization, and environment to permit analyses of use of level of care. Further details are given in Section 2.2 and Appendix A.

Key Findings: Table 5 (cont'd)

Number of days of hospital care per 1000 residents by:	Non-Winnipeg Residents	Winnipeg Residents	Ratio: Non-Winnipeg to Winnipeg
Location of care[8]			
In region	678	714	0.9
Out of region: Wpg	276	N/A	N/A
Out of region: not Wpg	62	30	2.1
Type of care[9]			
Adult surgical	239	230	1.0
Adult medical	573	348	1.6
Obstetric	86	61	1.4
Pediatric	75	35	2.1
Psychiatric	41	67	0.6
Discretionary nature of admission[10]			
High variation medical	626	396	1.6
Surgical	244	225	1.1
Low variation	83	77	1.1
Obstetric	64	44	1.5
Total[11]	1,016	743	1.4

[8] Location of care refers to the site of care delivery in relation to patient region of residence.

[9] Inpatient care was categorized into relevant clinical categories of care. Adult surgical care includes inpatient, but not outpatient surgery. Pediatric care includes both surgical and medical types of care. Rates of psychiatric care do not include separations from Eden, Selkirk and Brandon Mental Health Centres; consequently they under report psychiatric utilization by non-Winnipeg residents.

[10] Based on Wennberg's work, we identified three categories of inpatient care: high variation medical conditions such as pneumonia and gastroenteritis for which highly variable admission rates exist; surgical conditions such as cholecystectomy and appendectomy that show somewhat less variability; and low variation conditions such as heart attack and hip fracture which demonstrate relatively stable rates. Further details are given in Section 2.3. Rates of obstetric care reported for the discretionary indicator differ from (and are lower than) those reported for the type of care indicator because, in the former, obstetric separations that involve a surgical procedure (e.g. cesarean section) are included in the surgical category.

[11] Due to rounding, column totals may not equal overall totals.

element of discretion in the decision to use hospital resources, but which others argue is related to patient socioeconomic factors.

Indicators of Access to Hospital Care

Access, as judged by rates of persons using very high intensity hospital care, was roughly equivalent for both Winnipeg and rural residents (Table 6). Equivalent access to these services occurred in spite of rural Manitobans' lower use of care in more technologically sophisticated (i.e. teaching and large urban) hospitals. Only 22 persons per 1000 rural residents had contact with a teaching hospital in the year, compared with 39 persons per 1000 Winnipeg residents. Similarly, rural residents had lower levels of access to large urban hospitals, without an apparent effect on receipt of very high intensity services.

Compared to Winnipeg residents, rural residents had slightly higher rates of contact for adult inpatient surgery, but lower rates of outpatient surgery[20], producing identical overall rates of access to surgery despite the concentration of surgical specialists in Winnipeg.

Non-Winnipeg Residents: Location of Care

Type of care strongly affected whether rural residents were hospitalized in or out of their region of residence. Expressed as rates of use by the total population (Figure 5.1), out of region care in Winnipeg hospitals was lowest for pediatric care and highest for inpatient surgical care.[21] As a percent of each type of care (Figure 5.2), non-Winnipeg residents travelled to Winnipeg for a relatively small proportion of medical care (12.9 percent), and a larger proportion of pediatric and obstetrical care (20.1 and 32.2 percent, respectively). An even higher proportion of surgical care was received in Winnipeg hospitals: 46.5 percent of outpatient and 50.5 percent of inpatient surgical care.

[20] Outpatient surgery includes both pediatric and adult procedures.

[21] Inpatient surgical care includes procedures for adults only. Pediatric surgical cases are included in the pediatric category.

Key Findings: Table 6

Indicators of Access to Various Types of Short Stay Inpatient Care[1] by Non-Winnipeg and Winnipeg Residents

Number of persons hospitalized[2] per 1000 residents[3] for:	Non-Winnipeg Residents	Winnipeg Residents	Ratio: Non-Winnipeg to Winnipeg[4]
Surgical care			
Inpatient (adult)	30	27	1.11
Outpatient[5]	24	27	0.88
Combined inpatient and outpatient surgical care	54	54	0.99
Care at specialized facilities			
Teaching hospital care	22	39	0.57
Urban community hospital care	25	35	0.69
Large rural hospital care	36	1	N/A
Very high intensity inpatient care[6]	5.9	6.0	0.98

[1] Short stay inpatient care refers to the 147,817 admissions with lengths of stay ranging from 1 to 59 days.

[2] Rates of persons hospitalized are useful indicators of the ability of people to receive hospital care and are therefore relevant for comparisons of access. Only types of care for which access may be problematic are presented; the categories therefore do not sum to the total.

[3] Rates have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

[4] Ratios of non-Winnipeg to Winnipeg rates were calculated from numbers rounded to 2 decimal places and hence may differ slightly from what would be calculated using numbers in the table.

[5] Outpatient surgical care refers to the 31,790 outpatient contacts for major day surgery procedures. It includes both pediatric and adult cases.

[6] Very high intensity care refers to hospitalizations that fall in the highest 5 percent of resource utilization (based on DRG weight classifications). These include admissions for craniotomy and other major cases requiring intense hospital treatment.

Key Findings: Figure 5

Non Winnipeg residents: Short stay and outpatient separations by type of care and location of service

Figure 5.1 Rate of separation

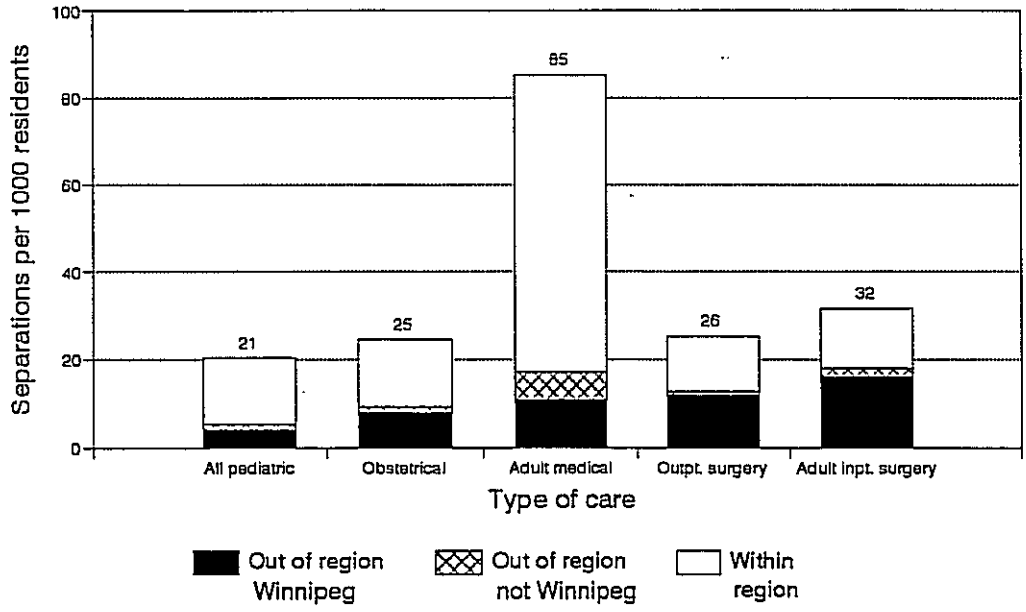
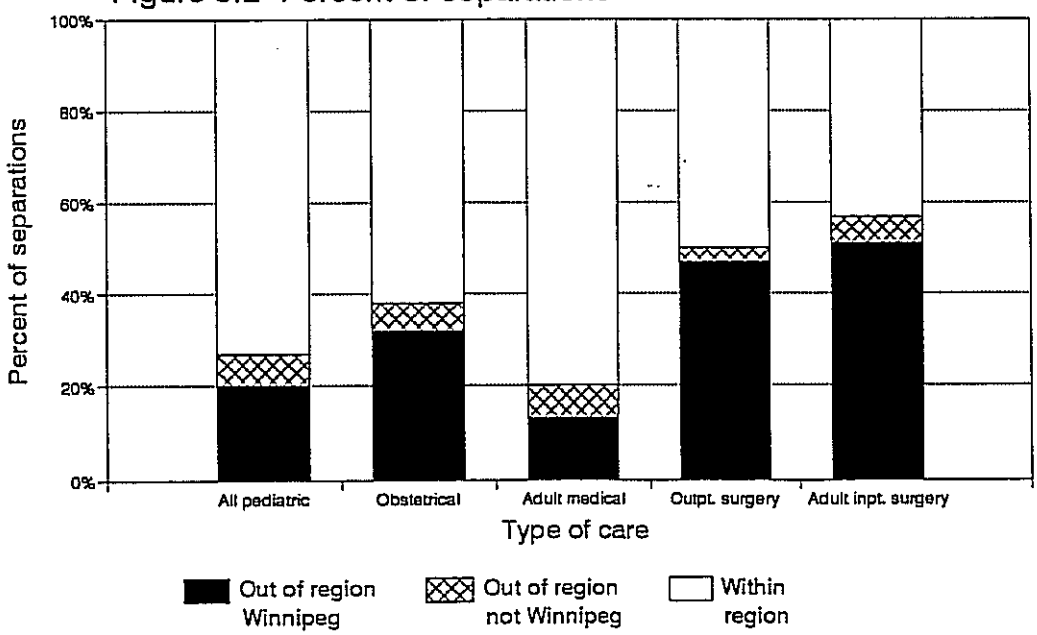


Figure 5.2 Percent of separations



3.4 Regional Comparisons

Use of All Hospital Care

Looking across regions, Interlake, Central and Eastman residents had the lowest adjusted rates of use of days of inpatient care per 1000 residents (Figure 6 and Table 7). Residents of Westman and Winnipeg had intermediate levels of use, with rates close to the provincial average of 1441 days per 1000 residents. The rate for Parklands residents was higher than the provincial average, at 1562 days. Together, Norman and Thompson residents had the highest regional rates of use of hospital days with use well above the provincial average, at 1934 and 2206 days per 1000 population, respectively.

Use of Long versus Short Stay Care

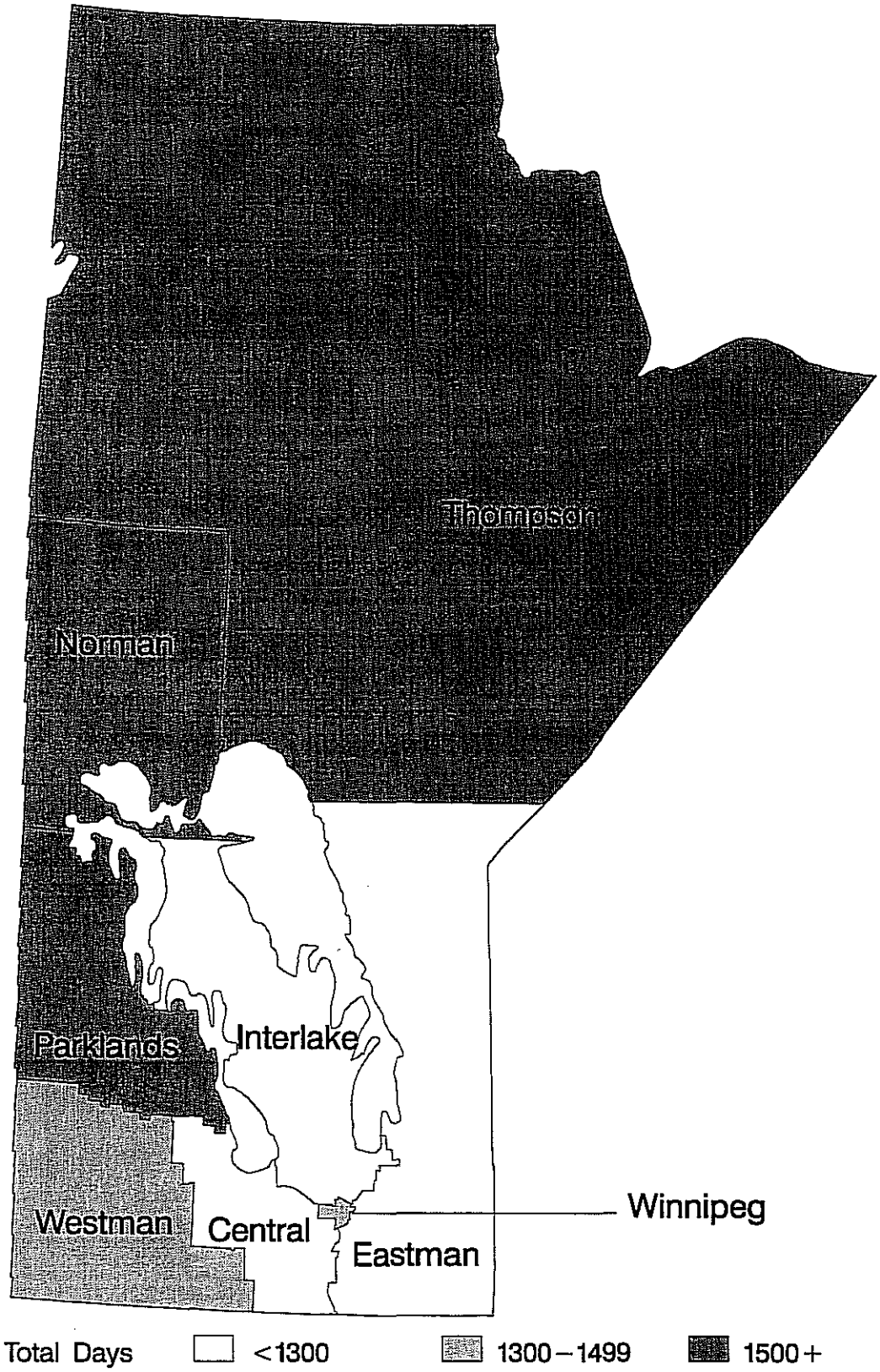
As in previous comparisons, very different patterns of use of short and long stay days contribute to regional differences in use of total hospital days (Table 7). Across all regions, Winnipeg residents remained the heaviest users of long stay hospital care (719 days per 1000 residents), using 119 percent more days per capita than Interlake residents, who had the lowest use of long stay days (Figure 7.1). As a percentage of total days, Winnipeg residents also used the greatest amount of long stay care (49.2 percent of total days) (Figure 7.2). Residents of other regions used proportionately less, ranging from 22.8 percent (Thompson) to 30.8 percent (Westman) of total days as long stay care. Among non-Winnipeg regions, Interlake, Eastman and Central had rates below the non-Winnipeg average of 402 long stay days per 1000 persons. Westman, Parklands, Thompson and Norman had rates that were higher than the rural average.

Across regions, short stay days were used differently than long stay days. As in previous comparisons, Winnipeg residents had the lowest adjusted rate of use of short stay hospital care (743 days per 1000 residents) as well as the lowest percentage of short stay hospital days (50.9 percent of total days). Thompson region had the highest adjusted rate of use of short stay care at 1540 days per 1000 residents, followed by Norman region with a rate of 1355, and Parklands at 1104 per 1000 residents. The other four regions had adjusted rates ranging from 920 to 985 days per 1000 residents.

Key Findings: Figure 6

All Hospital Care

Adjusted days per 1000 residents by region



Key Findings: Table 7

Regional Use of Hospital Resources: Use of Inpatient Care[1] by Short[2] Versus Long[3] Stay

	TYPE OF CARE	Winnipeg	Central	Interlake	Eastman	Westman	Parklands	Norman	Thompson	Non-Winnipeg Comparison	Manitoba
Number of residents		655,055	94,484	71,936	85,180	117,724	46,056	24,952	45,019	485,351	1,140,406
Number of persons hospitalized per 1000 residents	SHORT	75	101	99	98	106	123	142	159	110	90
	LONG	3	2	2	2	2	3	3	2	2	3
Number of hospital separations per 1000 residents	SHORT	101	148	148	148	159	194	224	264	168	130
	LONG	4	3	2	2	2	3	3	3	3	3
	TOTAL	105	151	150	151	161	196	228	269	170	133
Average length of stay per hospital separation	SHORT	7.3	6.3	6.4	6.1	6.6	6.3	5.4	4.4	6.1	6.6
	LONG	194.8	151.3	141.8	139.1	176.2	164.1	163.2	177.3	159.3	182.5
	AVERAGE	13.7	8.9	8.5	8.0	9.8	9.3	7.0	5.2	8.5	10.9

[1] Inpatient care includes all hospital stays of one day or longer received by Manitoba residents from hospitals in and out of province (151,444 separations).

[2] Short stay care refers to separations ranging from 1 to 59 days (147,817 separations).

[3] Long stay care refers to separations of 60 or more days (3627 separations).

Key Findings: Table 7 (cont'd)

	TYPE OF CARE	Winnipeg	Central	Interlake	Eastman	Westman	Parklands	Norman	Thompson	Non-Winnipeg Comparison	Manitoba
Number of days of hospital care per 1000 residents	SHORT	743	919	938	947	982	1,104	1,355	1,540	1,016	861
	LONG	719	378	328	330	428	479	533	502	402	580
	TOTAL	1,461	1,290	1,270	1,293	1,391	1,562	1,934	2,206	1,415	1,441

Key Findings: Figure 7

All hospital care
Adjusted number of days of care by short and long stay

Figure 7.1 Rate of days of care

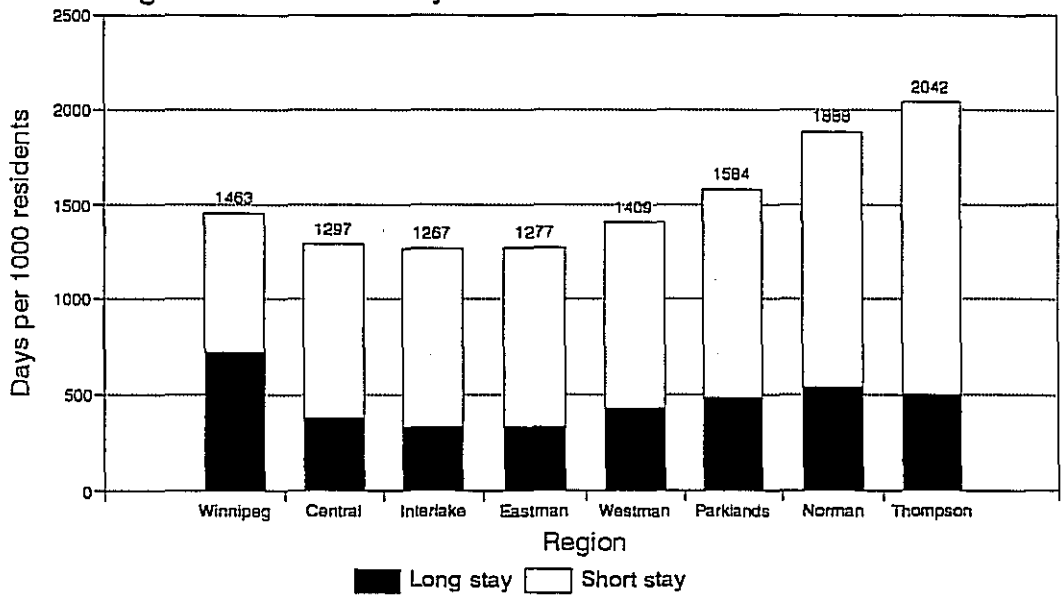
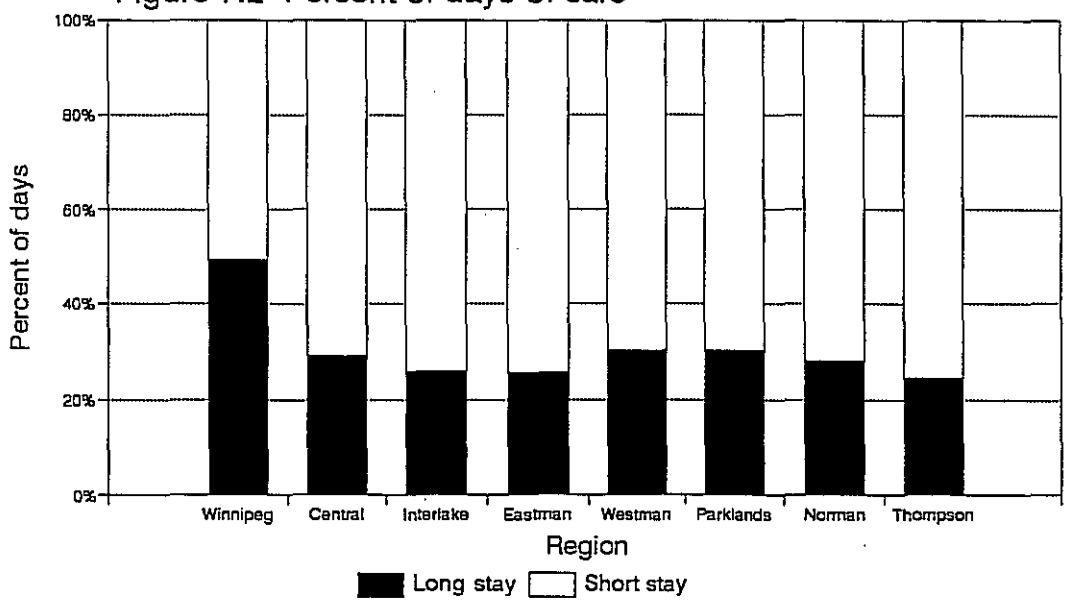


Figure 7.2 Percent of days of care



Supply of Hospital Beds

Differences between actual and effective bed supply varied across regions (Figure 8). For Winnipeg, effective bed supply was lower than actual bed supply because a considerable amount of care provided in Winnipeg hospitals goes to residents who live outside of Winnipeg. Conversely, for rural residents, effective bed supply ratios were higher than actual bed supply. These effects were greatest for Interlake, Eastman and Thompson because of their relatively high reliance on Winnipeg beds.

Patterns of effective bed supply correlated only roughly to patterns of utilization. Areas with higher rates of hospital beds per 1000 residents - Norman, Parklands, Westman and Thompson - had relatively high adjusted rates of use of total days of hospital care. Conversely, areas with lower bed supply had rates of utilization in the lower range. Some of the differences between patterns of effective bed supply and utilization rates are related to lower hospital occupancy rates in non-Winnipeg regions. Other differences occur because comparisons are being made between adjusted utilization rates and unadjusted measures of bed supply. For instance, although Thompson appears to have few beds in relation to adjusted patterns of utilization, this is due to its very young population structure.

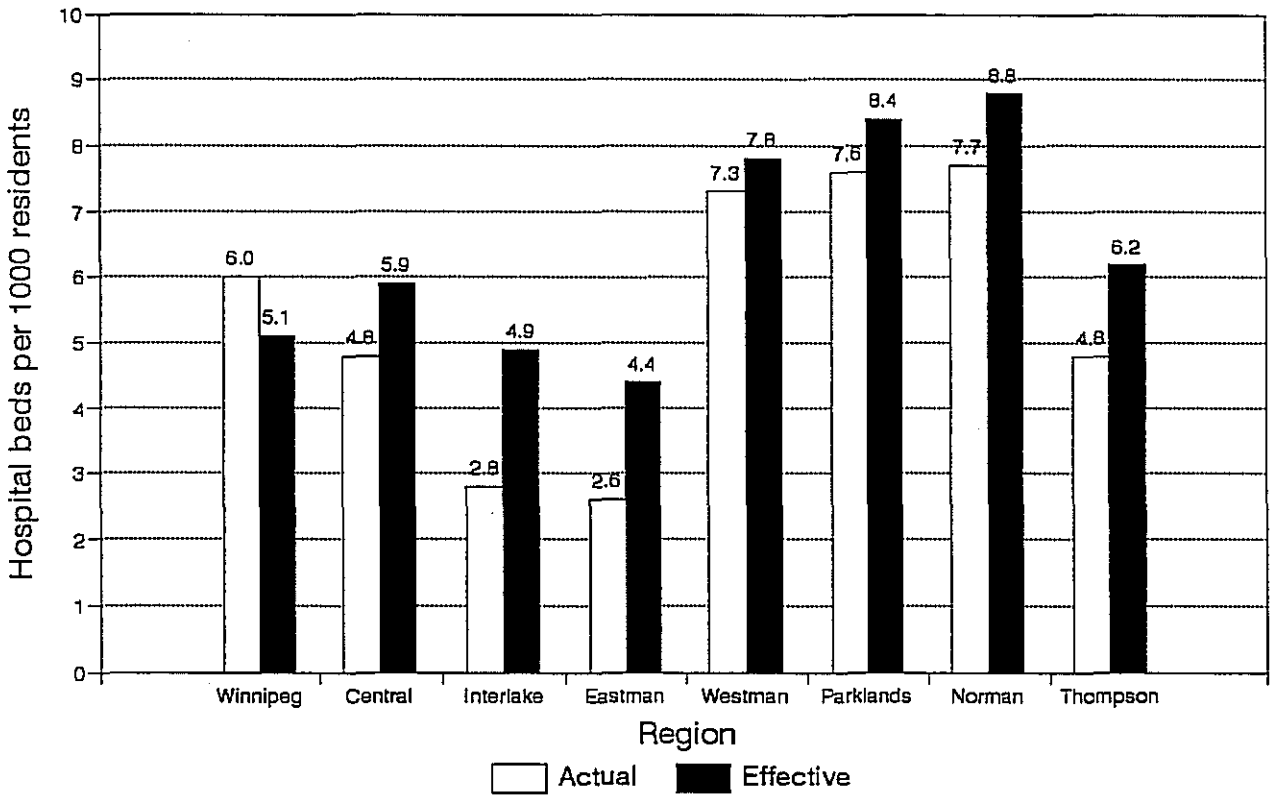
General Patterns of Use of Short Stay Care

Patterns of use of acute care across regions were similar, regardless of whether rates of individuals hospitalized, separations, or days of hospital care (Table 7 and Figures 9, 10, and 11) were considered. Winnipeg residents consistently had the lowest adjusted rates of use of short stay hospital care, with only 75 residents hospitalized, 101 separations, and 743 days of care per 1000 residents per year. As a group, Thompson, Norman and Parklands residents had the highest rates of use of acute care across all three measures, while Central, Interlake, Eastman and Westman occupied an intermediate position. Winnipeg utilization rates of acute care were less than half of the rate of Thompson, the region with highest rate of use in each of the three categories.

In general, patterns of average length of stay per hospital separation followed a pattern opposite to that for rates of individuals, separations and days (Figure 12). Thompson residents, who had the highest adjusted rates of use, had the shortest hospital stays, averaging

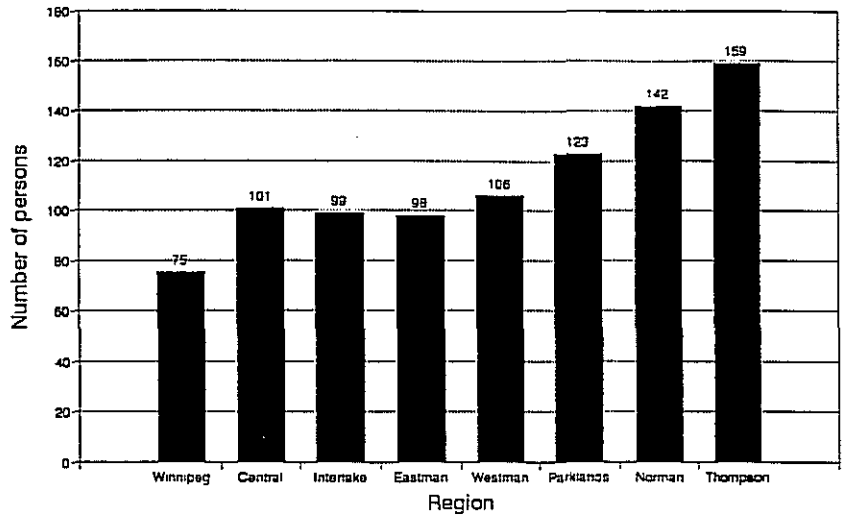
Key Findings: Figure 8

Actual and effective supply of hospital beds by region



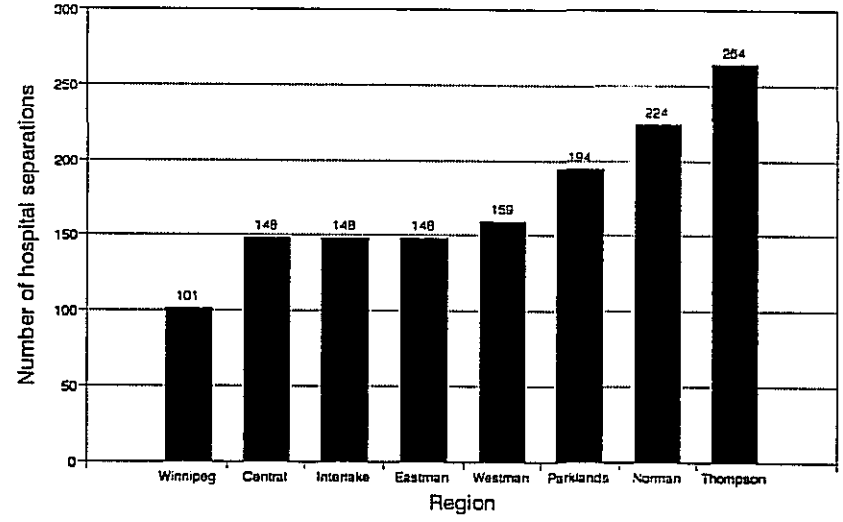
Key Findings: Figure 9

Short stay inpatient hospital care
Number of persons hospitalized per 1000 residents



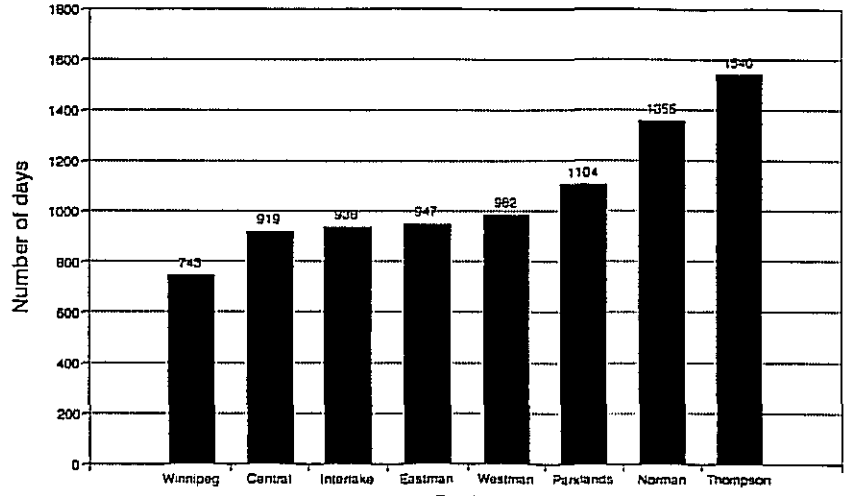
Key Findings: Figure 10

Short stay inpatient hospital care
Number of hospital separations per 1000 residents



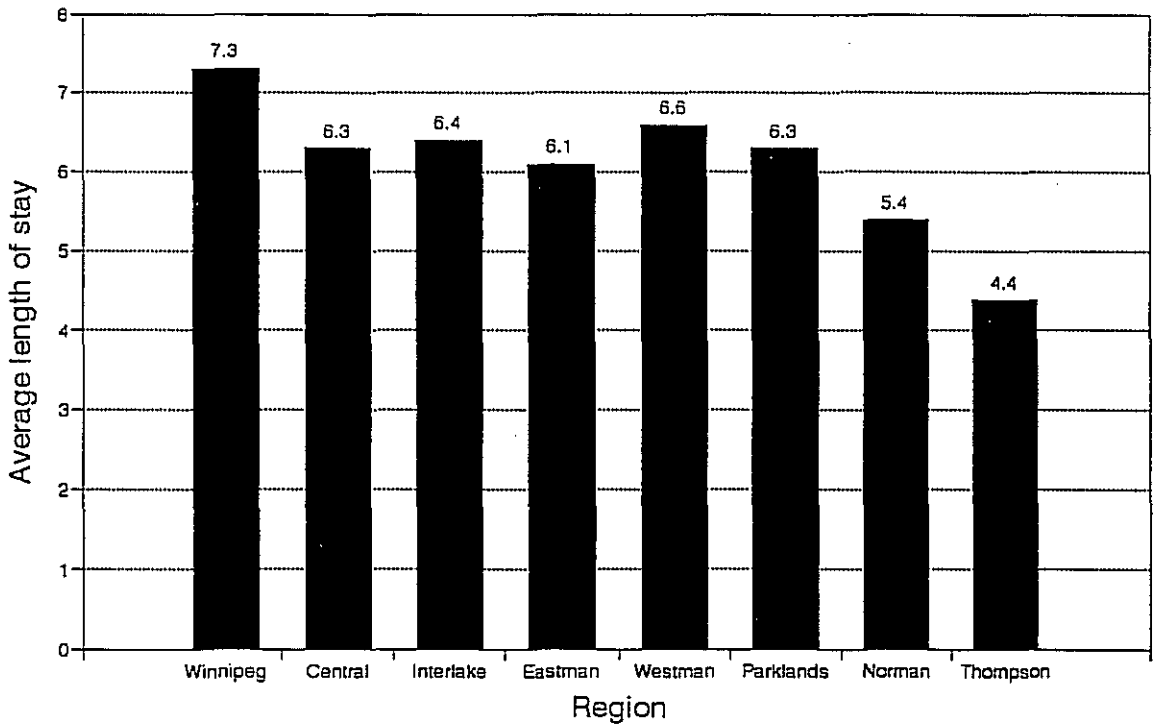
Key Findings: Figure 11

Short stay inpatient hospital care
Number of days of hospital care per 1000 residents



Key Findings: Figure 12

Short stay inpatient hospital care
Average length of stay per hospital separation



4.4 days per separation.[22] Norman residents, who had the next highest rates of use, had an average length of stay of 5.4 days. Winnipeg residents, who had the lowest rates of use of acute care, also had the longest hospital stays (7.3 days per hospital separation). Other regions occupied an intermediate position, with lengths of stay ranging from 6.1 to 6.6 days per acute separation.

Regions that had high rates of use of hospital utilization had rates that were consistently high across all age groups and both sexes, relative to other regions (Figure 13). Higher utilization rates for the population of a given region therefore resulted from higher relative rates of utilization for all residents, rather than a concentration of resources on one segment of the population (for instance, the elderly).

These differing patterns of use of short stay care were associated with differences in the way hospital care was used by patient comorbidity, case complexity, and other factors (Table 8). These patterns are examined in the sections that follow.

Use of Short Stay Care by Patient Comorbidity

For all regions, the highest rates of use of hospital days were for patients with lower levels of comorbidity; rates of use for patients with three or more comorbid conditions represented the smallest portion of acute care days used (Table 8).

There was a tendency for high use regions to also have higher rates of use of care for healthier patients (i.e. those with fewer comorbid conditions). In spite of this trend, however, there were similar regional patterns of percentage of care used by the sickest patients (Figure 14). That is, while Winnipeg residents used half as many acute days as Thompson residents, 22.4 percent of days for Winnipeg residents were provided for persons with two or more comorbid conditions, compared with 19.2 percent for Thompson residents. This suggests that lower use of acute care by Winnipeg residents is not associated with a concentration of resources on very sick patients. Over all regions, percentage of days used for higher comorbidity care was fairly stable, ranging from 15.6 percent to 22.4 percent.

---

[22] Admissions to Federal nursing stations, with an average length of stay of 1.0 days comprise 12.4 percent of admissions for Thompson residents. Adjusted rates of admissions to nursing stations are 27.6 per 1000 Thompson residents, while all other regions have rates of less than 1.0. This high use of nursing stations likely contributes to the very short observed length of stay for Thompson region.

Key Findings: Figure 13

Short stay inpatient care by age and sex
Actual number of days per 1000 residents

Figure 13.1 Males

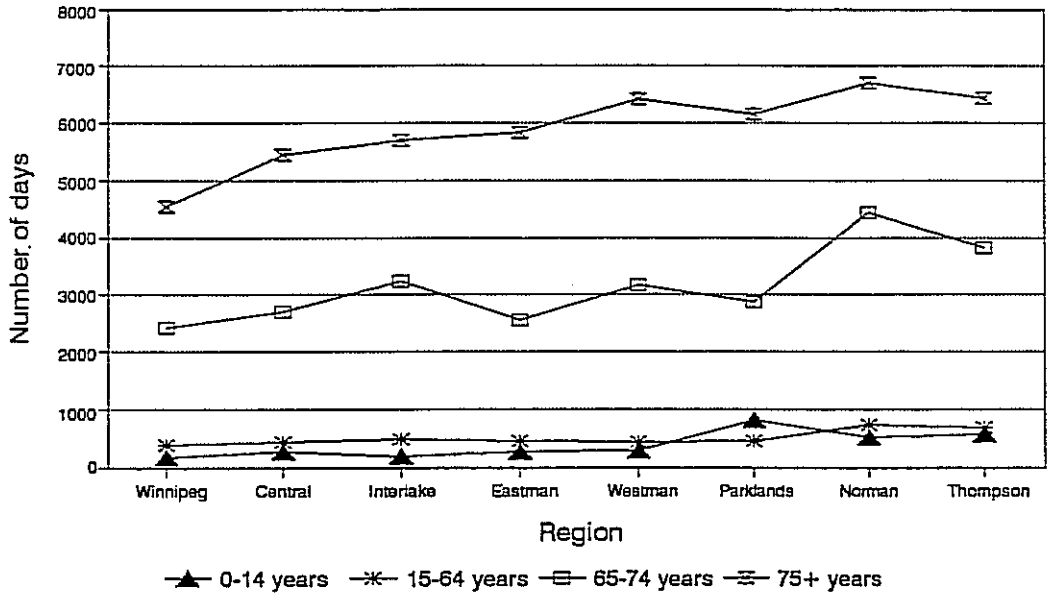
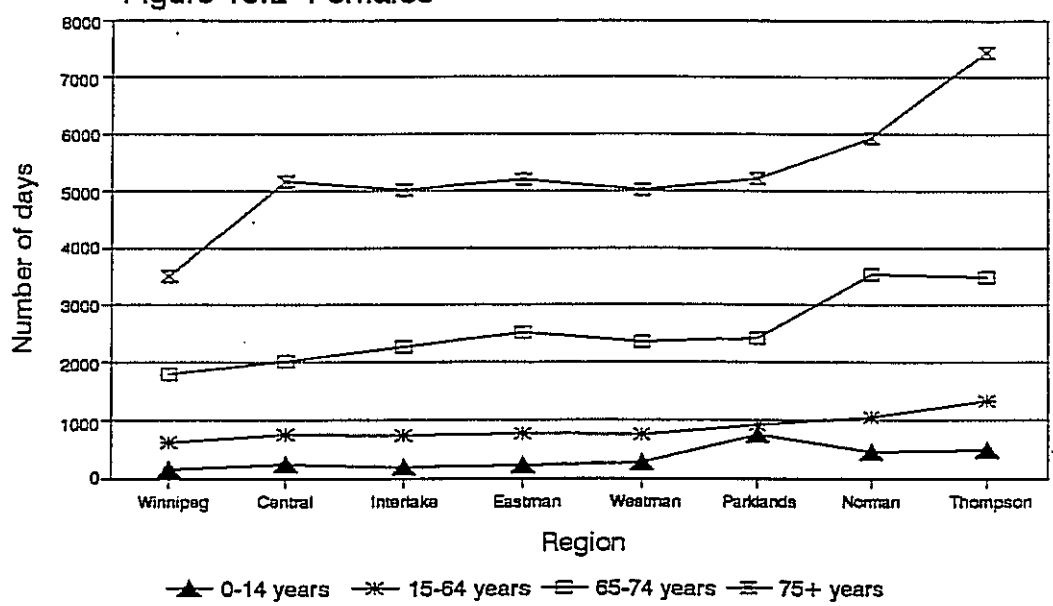


Figure 13.2 Females



Key Findings: Table 8

Regional Use of Hospital Resources:
Patterns of Differential Utilization of Short Stay Inpatient Care[1] Across Regions

Number of days of hospital care per 1000 residents[2] by:	Winnipeg residents	Central residents	Interlake residents	Eastman residents	Westman residents	Parklands residents	Norman residents	Thompson residents	Ratio: Highest to Lowest[3]
Number of comorbid conditions[4]									
None	462*	624	609	645	688	770	886	1,006**	2.2
1	115*	126	139	129	135	144	252**	221	2.2
2	78*	97	108	101	96	120	112	178**	2.3
3+	89	74	82	70*	70*	82	100	117**	1.7
Level of comorbidity and complications[5]									
Low	379*	583	546	580	651	712	880**	818	2.3
Moderate	210*	220	248	236	219	289	299	494**	2.4
High	155	119	145	128	123	117*	152	251**	2.1
Length of stay									
1-8 days	258*	412	387	604	433	556	604	670**	2.6
9-14 days	133*	172	185	252	189	208	252	270**	2.0
15-22 days	112*	117	129	197	141	141	197	215**	1.9
23-59 days	241	222*	236	225	228	223	278	326**	1.5

* Indicates region with lowest rate of utilization
** Indicates region with highest rate of utilization

[1] Short stay inpatient care refers to the 147,817 admissions with lengths of stay ranging from 1 to 59 days.

[2] Rates have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

[3] Ratios of the rate in the highest region to the rate in the lowest region were calculated from numbers rounded to 2 decimal places and hence may differ slightly from what would be calculated using numbers in the table.

[4] Comorbidity refers to medical conditions that exist in addition to the main reason for hospitalization; the type and number of comorbid conditions provide an indication of patients' health status and risk of death (Charlson et al. 1986).

[5] Comorbidity and complications affect the complexity of hospital care and the resources required to treat given patients. The RDRG program was used to classify patients into three groups based on their expected resource use.

Key Findings: Table 8 (cont'd)

Number of days of hospital care per 1000 residents by:	Winnipeg residents	Central residents	Interlake residents	Eastman residents	Westman residents	Parklands residents	Norman residents	Thompson residents	Ratio: Highest to Lowest
Intensity of care[6]									
Very low	58*	84	71	83	82	110	113	159**	2.7
Intermediate	583*	755	754	775	807	928	1,131	1,194**	2.0
Very high	103	81	112	87	96	75*	105	148**	2.0
Level of care[7]									
Teaching hospital	340	153	292	289	81*	141	232	436**	5.4
Urban community hospital	345	91	167	123	399**	70*	77	126	5.7
Large rural hospital	6*	377	172	186	15	553	930**	584	155.0
Other rural	7*	273	285	326	428**	281	23	221	61.1
Other	42	17*	23	21	28	55**	48	41	3.2
Location of care[8]									
In region	714	621	442*	474	831	803	965**	848	2.2
Out of region: Wpg	N/A	234	459	407	99*	169	303	542**	5.5
Out of region: not Wpg	30*	66	31	51	49	136**	73	68	4.5
Type of Care[9]									
Adult medical	348*	513	541	545	569	607	797	859**	2.5
Adult inpatient surgical	230	229	249	232	228	209*	303	359**	1.7
Obstetric	61*	84	64	76	74	94	92	150**	2.5
Pediatric	35*	56	41	54	62	170**	104	115	4.9
Psychiatric	67**	36	40	43	44	42	65	23*	2.9

[6] DRG weights were used to classify cases according to their intensity of resource use: the lowest ten percent of cases, the highest five percent of cases, with remaining cases classified as intermediate.

[7] Hospitals were grouped according to their size, level of specialization, and environment to permit analyses of use of level of care. Further detailes are given in Section 2.2 and Appendix A.

[8] Location of care refers to the site of care delivery in relation to patient region of residence.

[9] Inpatient care was categorized into relevant clinical categories of care. Adult surgical care includes inpatient, but not outpatient surgery. Pediatric care includes both surgical and medical types of care. Rates of psychiatric care do not include separations from Eden, Selkirk and Brandon Mental Health Centres; consequently they under report psychiatric utilization by residents of some regions.

Key Findings: Table 8 (cont'd)

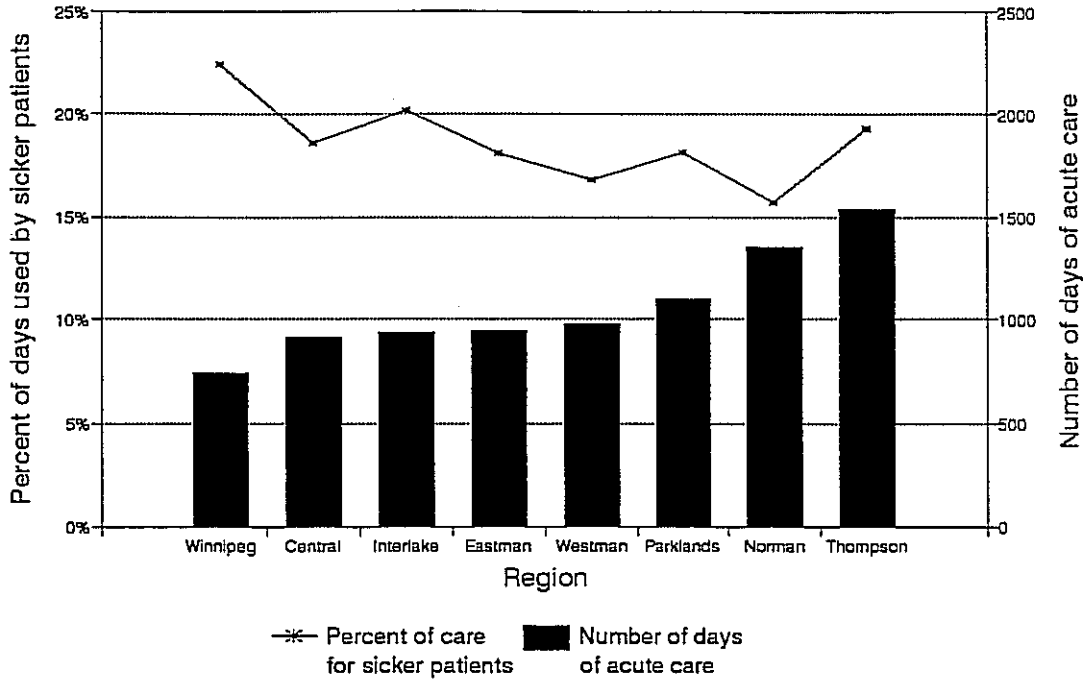
Number of days of hospital care per 1000 residents by:	Winnipeg residents	Central residents	Interlake residents	Eastman residents	Westman residents	Parklands residents	Norman residents	Thompson residents	Ratio: Highest to Lowest
Discretionary nature of admission[10]									
High variation medical	396*	553	556	571	616	738	876	902**	2.3
Surgical	225	237	240	230	223*	228	324	384**	1.7
Low variation	77	71*	93	85	86	72	96**	92	1.4
Obstetric	44*	59	48	60	55	64	63	115**	2.6
Total[11]	743*	919	938	947	982	1,104	1,355	1,540**	2.1

[10] Based on Wennberg's work, we identified three categories of inpatient care: high variation medical conditions such as pneumonia and gastroenteritis for which highly variable admission rates exist; surgical conditions such as cholecystectomy and appendectomy that show somewhat less variability; and low variation conditions such as heart attack and hip fracture which demonstrate relatively stable rates. Further details are given in Section 2.3. Rates of obstetric care reported for the discretionary indicator differ from (and are lower than) those reported for the type of care indicator because, in the former, obstetric separations that involve a surgical procedure (e.g. cesarean section) are included in the surgical category.

[11] Due to rounding, column totals may not equal overall totals.

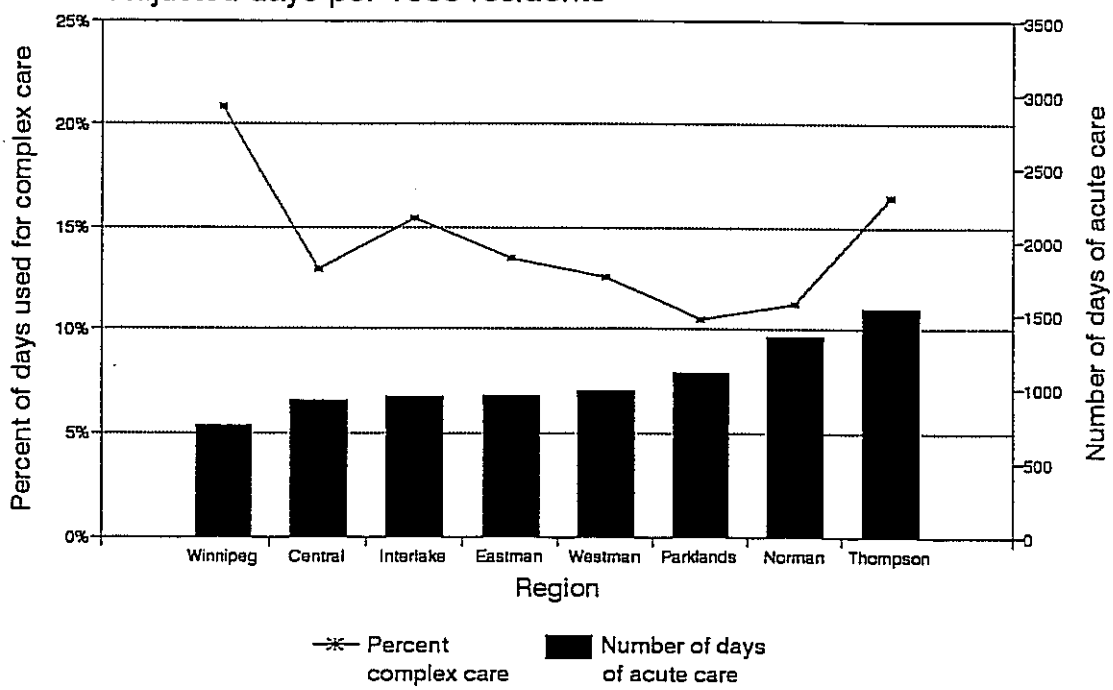
Key Findings: Figure 14

Percentage use of acute care by sicker patients
Adjusted days per 1000 residents



Key Findings: Figure 15

Percentage of acute care used for complex care
Adjusted days per 1000 residents



Use of Short Stay Care by Level of Comorbidity and Complications

For all regions, over 50 percent of days were provided to patients with low comorbidity and complications (Table 8). While rates of use of care by complexity level vary across regions, there was no relationship between rates of use and percentage of short stay days for provision of care to patients with high levels of comorbidity and complications (Figure 15).

Use of Short Stay Care by Length of Stay

Across length of stay categories, the greatest regional differences were for very short stays of 1 to 8 days, where the ratio between highest and lowest rate regions was 2.6 (Table 8 and Figure 16). Variation decreased as length of stay increased (i.e. ratios of highest to lowest regional rates were 2.0 for 9 to 14 day stays; 1.9 for 15 to 22 day stays; and 1.5 for stays of 23 to 59 days). Winnipeg residents had the lowest use of days for very short stays, measured both as adjusted days and as a percentage of short stay days. Thompson residents had the highest rates of use in all four length of stay categories. Across other regions, however, there was no consistent relationship between patterns of use by length of stay and rates of use of acute care days.

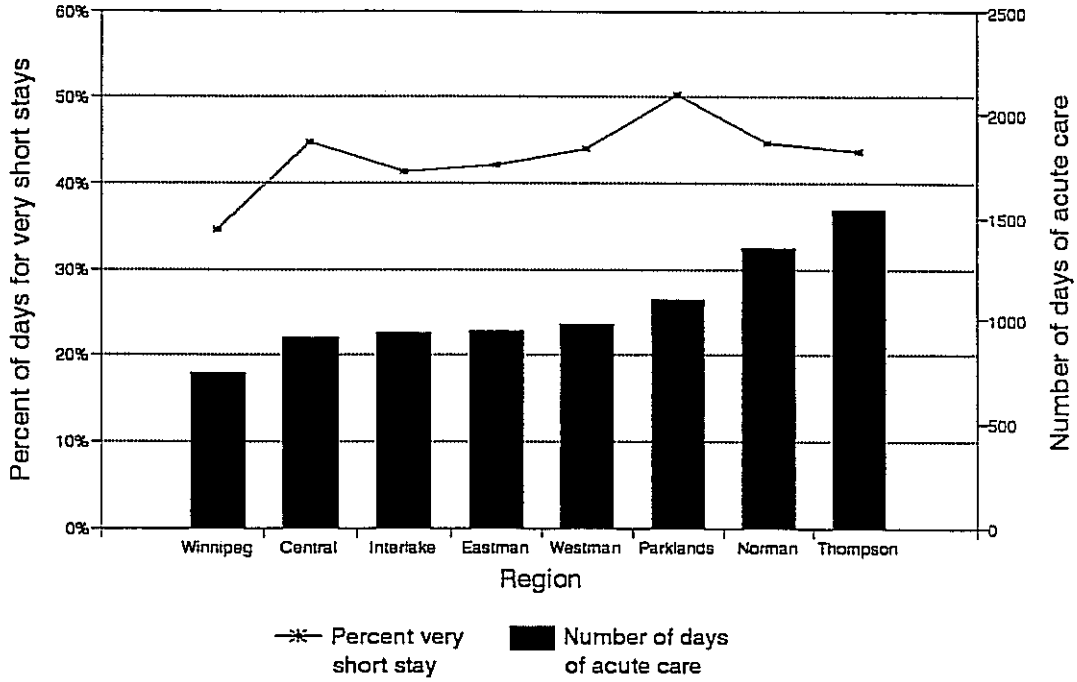
Use of Short Stay Care by Intensity of Resources

Across intensity levels, very low intensity care (e.g. hospitalizations requiring few resources, such as false labour and pediatric tonsillectomy) showed the greatest regional variation (Table 8), with some suggestion that as use of acute days increased, use of lower intensity care also increased. For instance, Winnipeg residents, with the lowest use of short stay days, also had the lowest rate of very low intensity and intermediate intensity care days. Thompson residents, who had the highest use of acute care, had the highest rates of use for all intensity levels. Ratios of use for Thompson residents in comparison to Winnipeg residents varied by intensity level: 2.7 for very low intensity care, 2.0 for intermediate intensity care and 1.4 for very high intensity care, consistent with an inverse relationship between use of short stay days and use of lower intensity care.

There was, however, no consistent relationship between rate of use of short stay days and percentage of care used in very high intensity care (Figure 17).

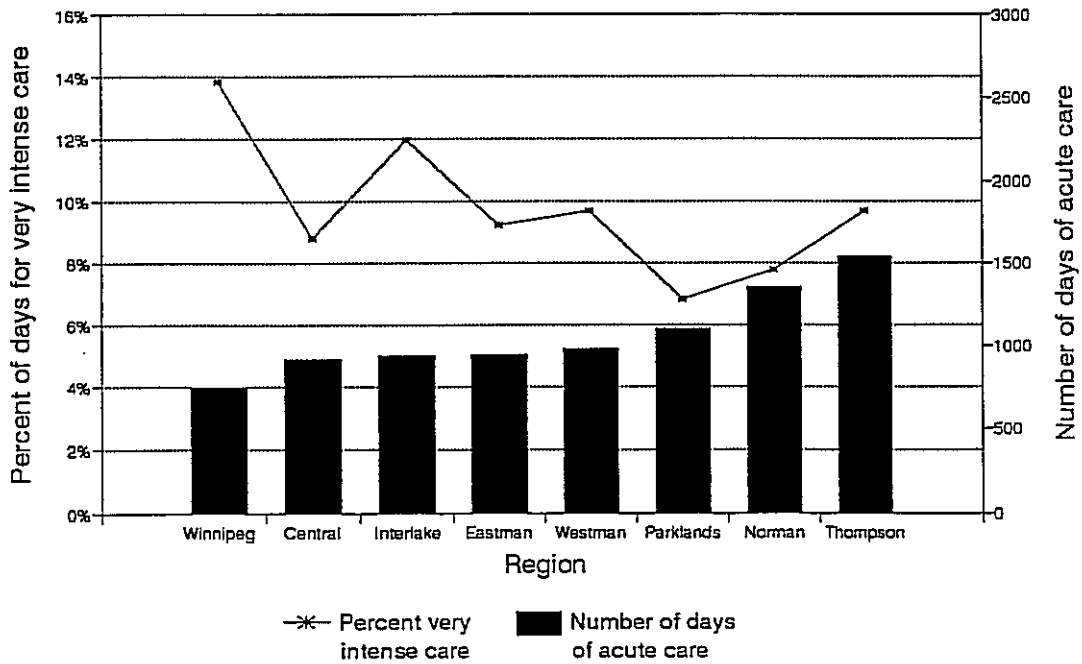
Key Findings: Figure 16

Percentage of acute care used for very short stays
Adjusted days per 1000 residents



Key Findings: Figure 17

Percentage of acute care used for very high intensity care
Adjusted days per 1000 residents



Use of Short Stay Care by Level of Care

Patterns of use of more specialized urban hospitals, particularly teaching hospitals, varied markedly across regions (Table 8 and Figure 18). Adjusted rates of use of teaching hospitals ranged from 81 days per 1000 Westman residents to 436 days per 1000 residents of Thompson region. As a percentage of short stay days, only 8.2 percent of Westman residents' days and 12.8 percent of Parklands residents' days were spent in teaching hospitals, compared with 45.8 percent of Winnipeg residents' days.[23]

Similar variation is found when the sum of days used in either teaching or large urban hospitals is considered. Parklands residents used only 211 days per 1000 residents in this level of care, while Winnipeg residents used 685 days and Thompson residents used 562 days.

Rates of use of specialized hospital care are likely influenced by factors such as proximity to specialized hospitals, referral patterns, transportation arrangements for transfer to higher levels of care, and the constellation of available regional hospital resources. The utilization patterns of Westman and Parklands residents suggest that other levels of hospital care can substitute for care provided by teaching hospitals.

Use of Short Stay Care by Discretionary Nature of Services

Rates of care for low variation conditions, for which there is little clinical ambiguity about the need for hospitalization, showed the smallest differences across regions (i.e. the ratio of the highest region to the lowest region was 1.4; Table 8 and Figure 19). Consistent with findings reported by others (Wennberg et al. 1989), variation for surgical conditions was slightly higher, with a highest to lowest ratio of 1.7, but the greatest differences in rates of use across regions occurred for high variation medical conditions, with a highest to lowest ratio of 2.3. In general, higher rates of use of days for surgical and high variation medical conditions were associated with higher rates of use of short stay care (Figure 19).

---

[23] High rates of use of teaching hospitals by a given region are likely to be associated with higher costs of providing an average day of care to regional residents. While accurate per diem costs for Manitoba hospitals are not available, average interprovincial per diem charges (which are used to charge non-Manitoba residents for care) provide an estimate of differences in cost of different levels of care. Interprovincial charges are much higher for teaching hospitals that for urban community and rural hospitals (see Appendix B). Similarly, Iglehart, in the United States, has documented that patient care costs in teaching hospitals are generally higher than those in community hospitals (1993).

Key Findings: Figure 18

Short stay inpatient care by level of care
Adjusted number of days of care

Figure 18.1 Rate of days used by level of care

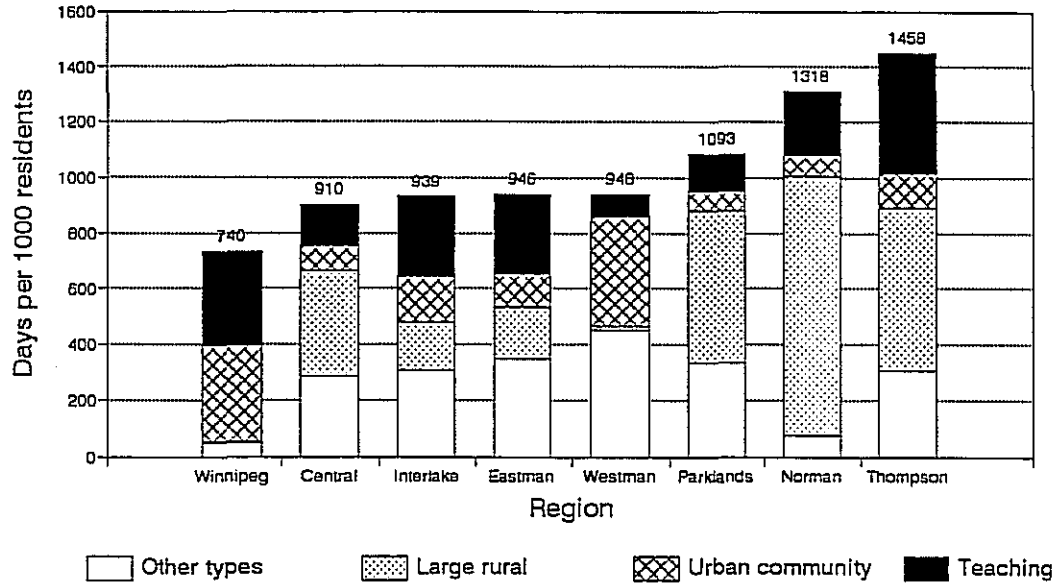
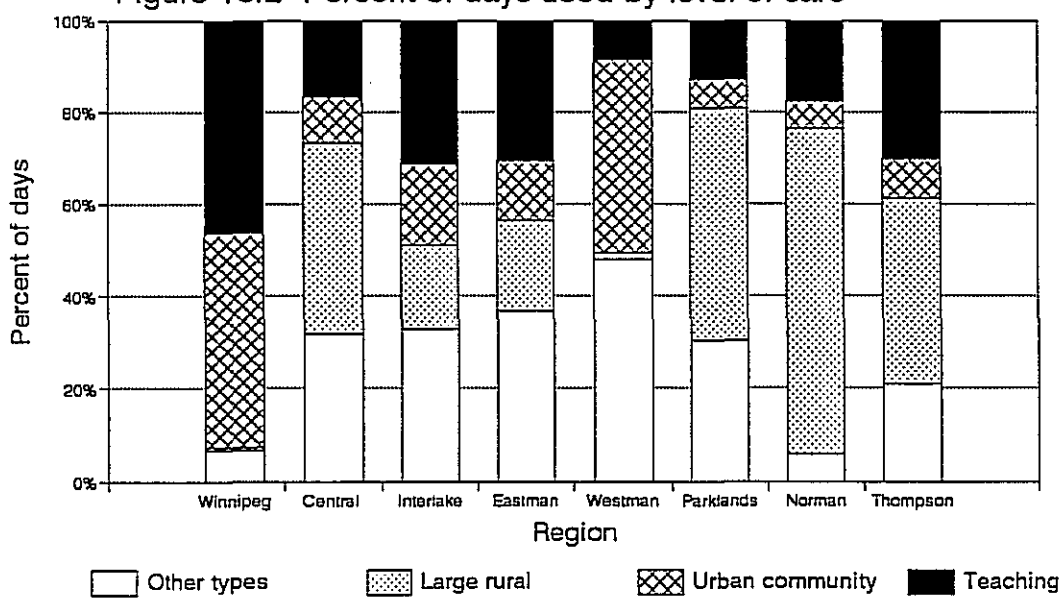
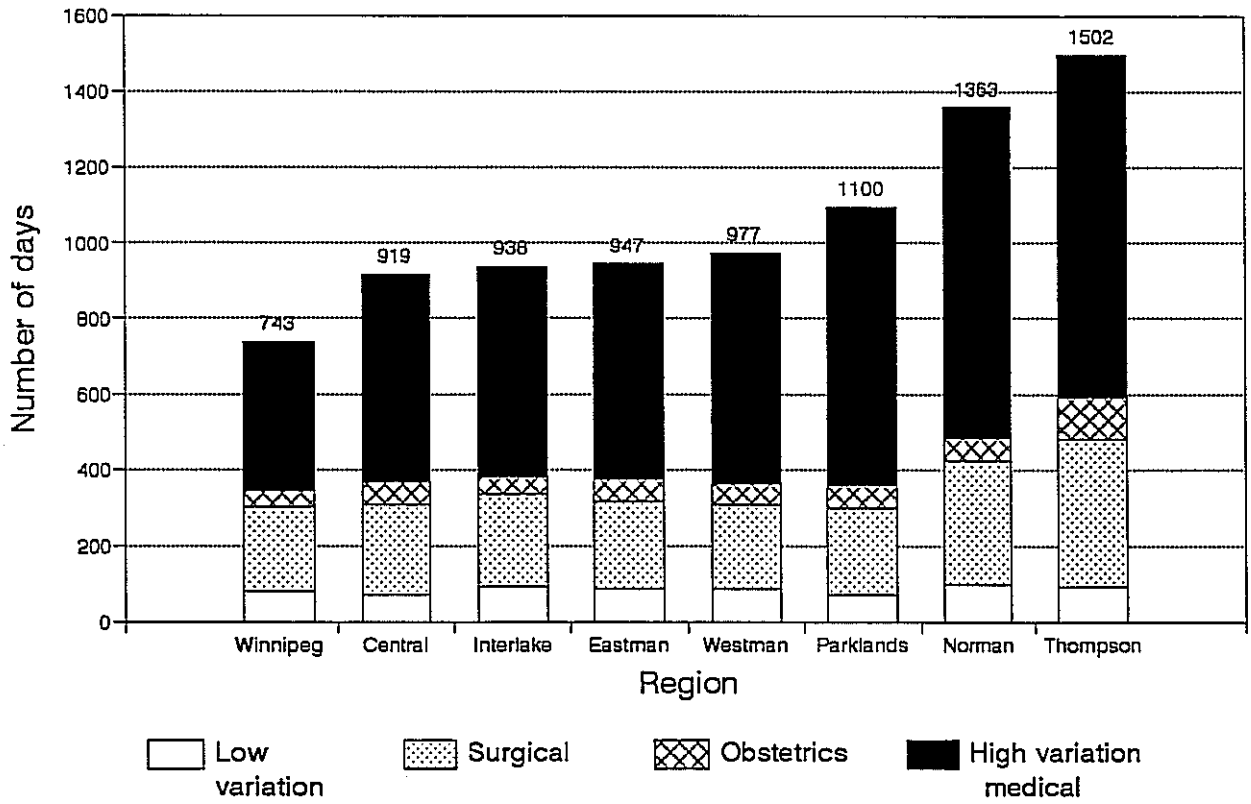


Figure 18.2 Percent of days used by level of care



Key Findings: Figure 19

Short stay inpatient care by discretionary nature of admission
Adjusted number of days per 1000 residents



Use of Short Stay Pediatric Care

Use of adjusted pediatric days per 1000 total population[24] was highly variable across regions, with rates ranging from 35 days per 1000 residents for Winnipeg, to 170 days per 1000 residents for Parklands (Table 8 and Figure 20). In general, higher rates of use of pediatric days were associated with higher rates of use of short stay care. However, Parklands region had highly unusual patterns of pediatric care: children in Parklands had 4.1 times as many separations from hospital and spent 4.9 times as many days in hospital, compared to Winnipeg children. Children resident in Parklands even had higher use of acute care than did children from Thompson: 1.2 times as many separations and 1.5 times the days of care. These patterns were also evident in the age and sex specific analyses (Figure 13).

Use of Surgical Care

Rates of adult surgical care showed lower regional variation than medical or pediatric care (Table 8). Winnipeg residents had the lowest rate of adult inpatient surgery, with 29 separations per 1000 residents and Thompson residents had the highest rate, at 42 separations per 1000 residents (Figure 21). Levels of use of outpatient surgery were reversed: together, Thompson and Parklands residents had the lowest rates of outpatient surgery and Winnipeg had the highest. Combined rates of outpatient and adult inpatient surgical cases showed low variability despite a concentration of surgical specialists in Winnipeg, with Norman residents undergoing the highest rates of surgery per 1000 residents.

Indicators of Access to Hospital Care

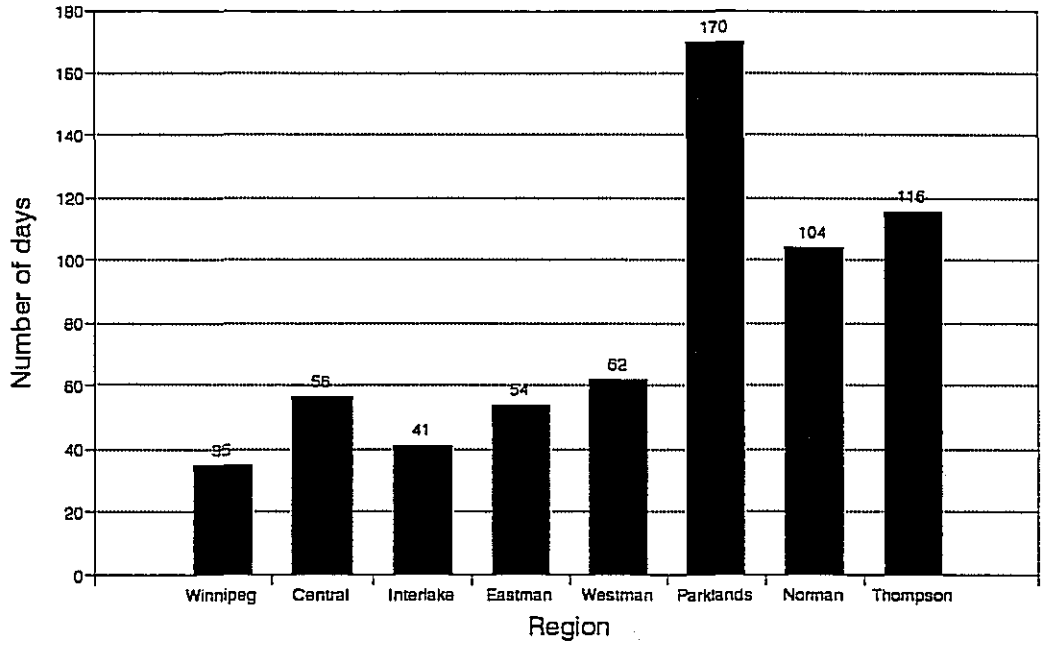
In general, residents of Thompson, who face the greatest geographical barriers to access, also had the highest rates of use of acute hospital care. Specifically, they were much more likely to be hospitalized for short stay care (2.1 times) than residents of the lowest use region (Winnipeg), 3.1 times more likely to be admitted to a medical bed, 1.4 times as likely to undergo surgery, and 1.3 times as likely to receive care requiring the highest intensity of resources.

Access, judged as rates of persons using very high intensity care (such as coronary bypass procedures, craniotomy and other major cases requiring intense hospital treatment), services

[24] Adjusted rates of use of pediatric care measure pediatric utilization per 1000 standard population (where the age distribution is equivalent to the provincial population) and are comparable across regions. Patterns found with these rates are similar to those found when pediatric utilization is measured per 1000 individuals aged 0 to 14, as in Figure 13.

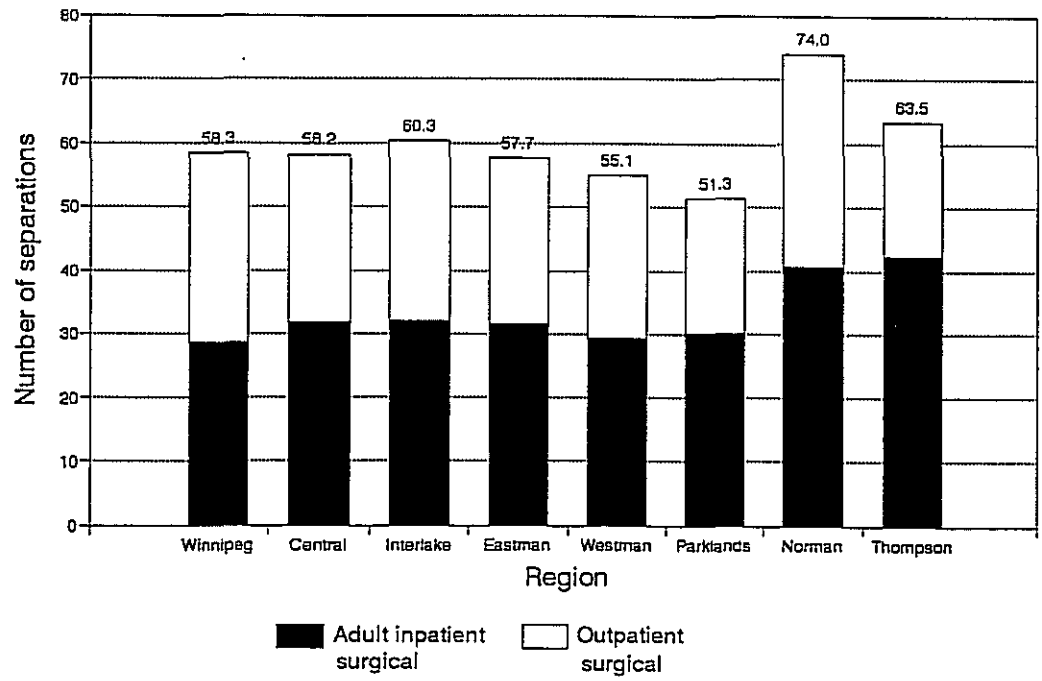
Key Findings: Figure 20

Short stay pediatric hospital care
Number of days of hospital care per 1000 residents



Key Findings: Figure 21

Outpatient and adult inpatient surgical care
Number of separations per 1000 residents



of more technologically sophisticated hospitals, and surgical services, was variable across regions (Table 9). Rates of persons using very high intensity care ranged from 5.1 to 8.3 persons per 1000 residents. For Winnipeg, where residents presumably have the greatest access to high intensity services due to geographical proximity, 6.04 persons per 1000 received very high intensity services, a rate only slightly higher than the provincial average of 5.98. Residents of Westman had equivalent access to these services (6.01 persons per 1000 residents). Residents of Interlake, Norman and Thompson had higher rates of access to these services, while residents of three regions (Central, Parklands, and Eastman) had lower rates of use of very high intensity resources. Residents of Thompson had rates of use that were 61 percent higher than residents of the region that had the lowest rate of access to high intensity care (Central region).

In terms of access to more technologically sophisticated care, Winnipeg and Thompson residents had high rates of use of teaching hospitals: 38.5 and 37.5 persons admitted per 1000 residents, respectively, compared to Westman with a rate of 8.3 persons per 1000 residents.

In terms of access to surgical services, combined rates of persons receiving outpatient or adult inpatient surgery were quite similar across regions (Table 9), with Norman residents having the highest combined rates (67 persons per 1000 residents). Residents of Thompson and Parklands had the lowest rates of outpatient surgical use and Norman residents the highest.

Across the measures of access, the rates of the highest to lowest rates ranged from a low of 1.4 for adult inpatient surgical care (i.e. the region with the highest rate, Thompson, hospitalized 40 percent more persons per 1000 population than did the lowest rate region, Central) to a high of 4.6 for teaching hospital use (where the highest rate region, Winnipeg hospitalized 360 percent more persons per 1000 population than did Westman, the region with the lowest rate of teaching hospital use). For the most part, access of non-Winnipeg residents to surgical care and very resource intense care appears to be adequate, in relation to patterns for Winnipeg residents. In fact, Winnipeg residents had moderate or low rates of utilization of these services, with the exception of use of teaching hospitals.

Use of Acute and Outpatient Care by Location

Depending on region of residence, rural residents received very different rates and percentages of acute care in or out of their region of residence (Table 10). Residents of

Key Findings: Table 9

Regional Use of Hospital Resources: Indicators of Access to Various Types of Short Stay Inpatient Care[1] Across Regions

Number of persons hospitalized[2] per 1000 residents[3] for:	Winnipeg residents	Central residents	Interlake residents	Eastman residents	Westman residents	Parklands residents	Norman residents	Thompson residents	Ratio: Highest to Lowest[4]
Surgical care									
Inpatient (adult)	27*	30	30	29	27*	28	37	38**	1.4
Outpatient[5]	27	25	26	25	24	20*	30**	20*	1.5
Combined inpatient and outpatient surgical care	54	55	56	54	51	48*	67**	58	1.4
Care at specialized facilities									
Teaching hospital care	38.5**	18.7	32.8	34.0	8.3*	15.6	20.6	37.4	4.6
Urban community hospital care	35	13	21	17	49**	9*	9*	15	5.4
Large rural hospital care	1*	47	18	23	2	73	114**	76	114.0
Very high intensity inpatient care[6]	6.1	5.1*	6.9	5.3	6.0	5.2	7.0	8.2**	1.6

* Indicates region with lowest rate of utilization
** Indicates region with highest rate of utilization

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[1] Short stay inpatient care refers to the 147,817 admissions with lengths of stay ranging from 1 to 59 days.

[2] Rates of persons hospitalized are useful indicators of the ability of people to receive hospital care and are therefore relevant for comparisons of access. Only types of care for which access may be problematic are presented; the categories therefore do not sum to the total.

[3] Rates have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

[4] Ratios of the rate in the highest region to the rate in the lowest region were calculated from numbers rounded to 2 decimal places and hence may differ slightly from what would be calculated using numbers in the table.

[5] Outpatient surgical care refers to the 31,790 outpatient contacts for major day surgery procedures. It includes both pediatric and adult cases.

[6] Very high intensity care refers to hospitalizations that fall in the highest 5 percent of resource utilization (based on DRG weight classifications). These include admissions for craniotomy and other major cases requiring intense hospital treatment.

Key Findings: Table 10

Regional Use of Hospital Resources: Use of Short Stay Inpatient[1] Care by Location of Service[2]

Rate of Separations[3]	In Region	Out of Region Winnipeg	Out of Region Not Winnipeg	Total
Central	101	36	12	148
Interlake	76	66	6	148
Eastman	75	63	10	148
Westman	136	13	10	159
Parklands	146	23	25	194
Norman	175	35	14	224
Thompson	182	64	15	264

Percent of Separations	In Region	Out of Region Winnipeg	Out of Region Not Winnipeg	Total
Central	68	24	8	100
Interlake	51	45	4	100
Eastman	51	42	7	100
Westman	86	8	6	100
Parklands	75	12	13	100
Norman	78	16	6	100
Thompson	69	24	6	100

[1] Short stay inpatient care refers to the 147,817 admissions with lengths of stay ranging from 1 to 59 days.

[2] Location of service refers to the site of care delivery in relation to patient region of residence.

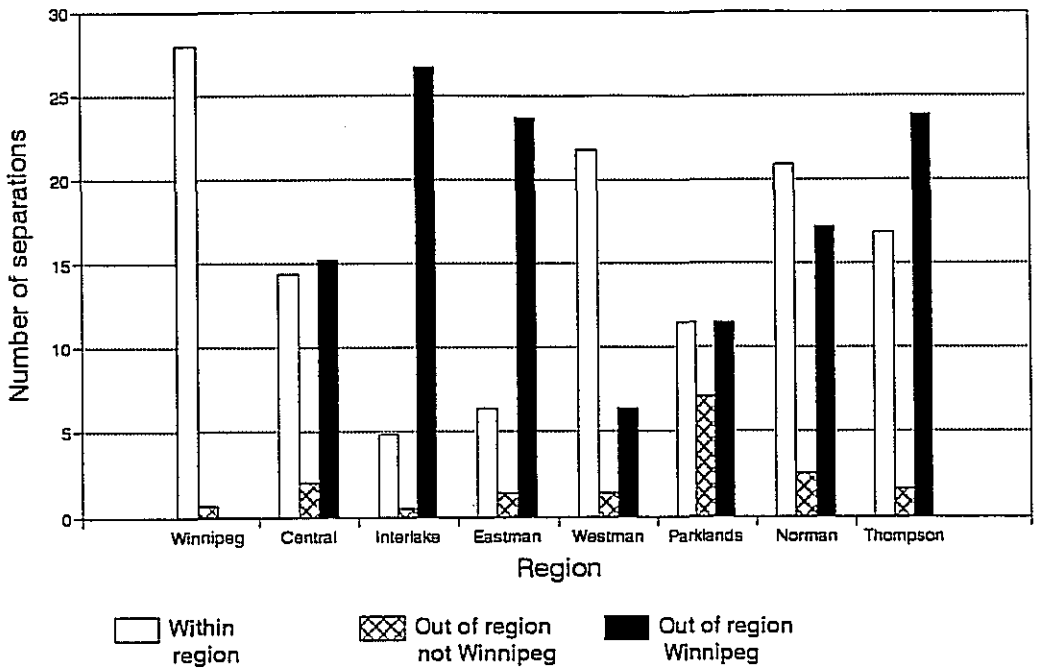
[3] Rates are expressed as number of hospital separations per 1000 residents and have been age- and sex-adjusted using Manitoba population rates and an indirect method of standardization.

Interlake and Eastman received only 51 percent of their acute hospitalizations within region, while Winnipeg hospitals provided over 40 percent of their care. Other regions provided much more of their own residents' care, with Westman providing the highest percentage (86 percent). Parklands residents had the highest rates of out of region, but not to Winnipeg, hospitalizations, likely reflecting use of services in Saskatchewan.

Different patterns were evident by type of care. For surgical care, residents of many non-Winnipeg regions obtained access to services by seeking a high proportion of care out of their region of residence, most often in Winnipeg (Figures 22 and 23). Higher rates of medical (Figure 24), obstetric (Figure 25), and pediatric (Figure 26) care were provided in region, but the pattern varied by region. Eastman, Interlake, and Thompson residents received relatively high rates of these types of care in Winnipeg hospitals.

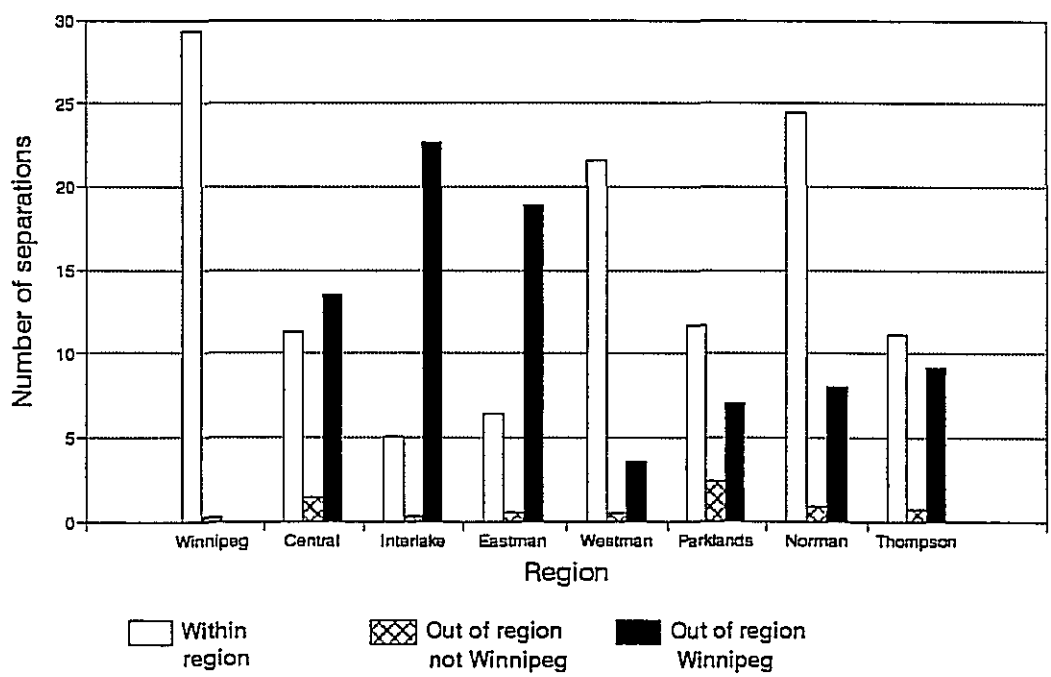
Key Findings: Figure 22

Adult surgical short stay inpatient care by location of service
Adjusted separations per 1000 residents



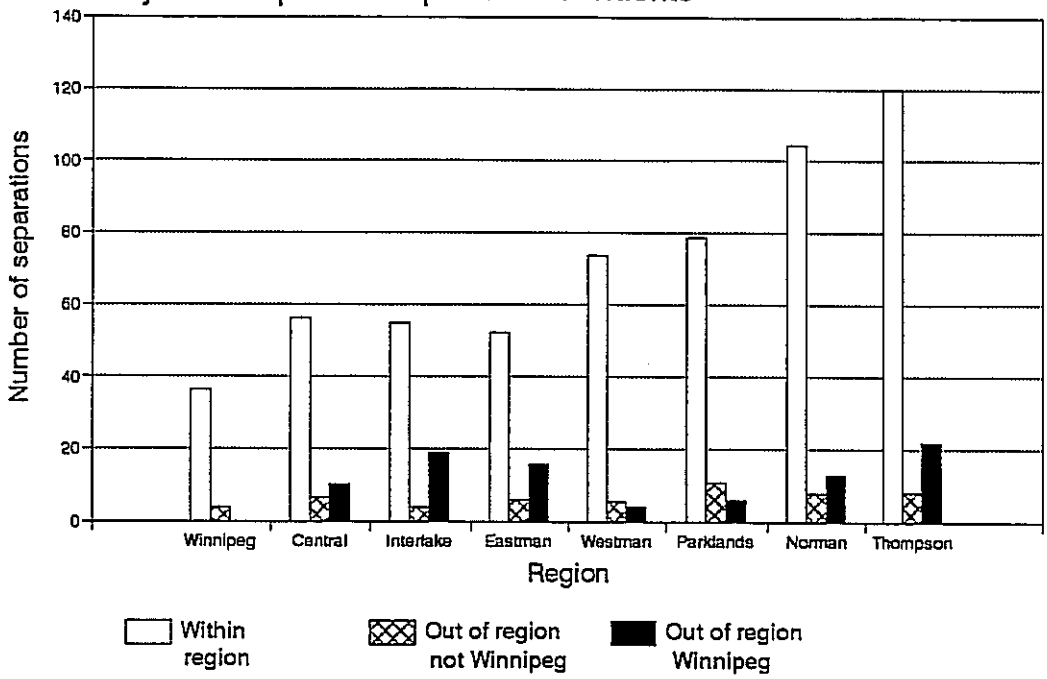
Key Findings: Figure 23

Outpatient surgical care by location of service
Adjusted separations per 1000 residents



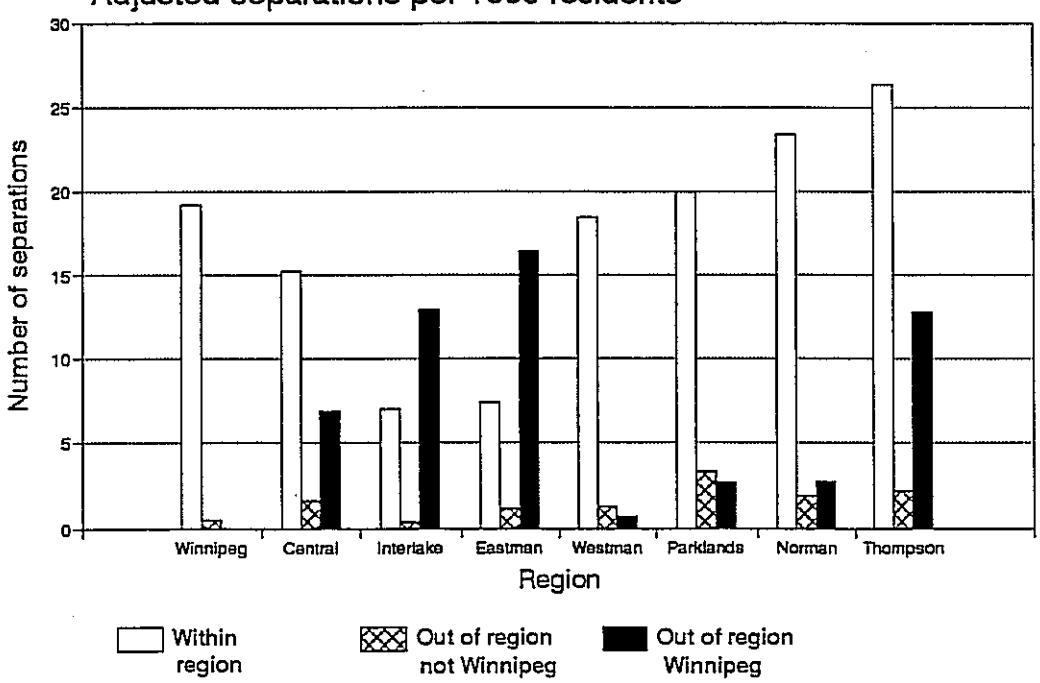
Key Findings: Figure 24

Adult medical short stay inpatient care by location of service
Adjusted separations per 1000 residents



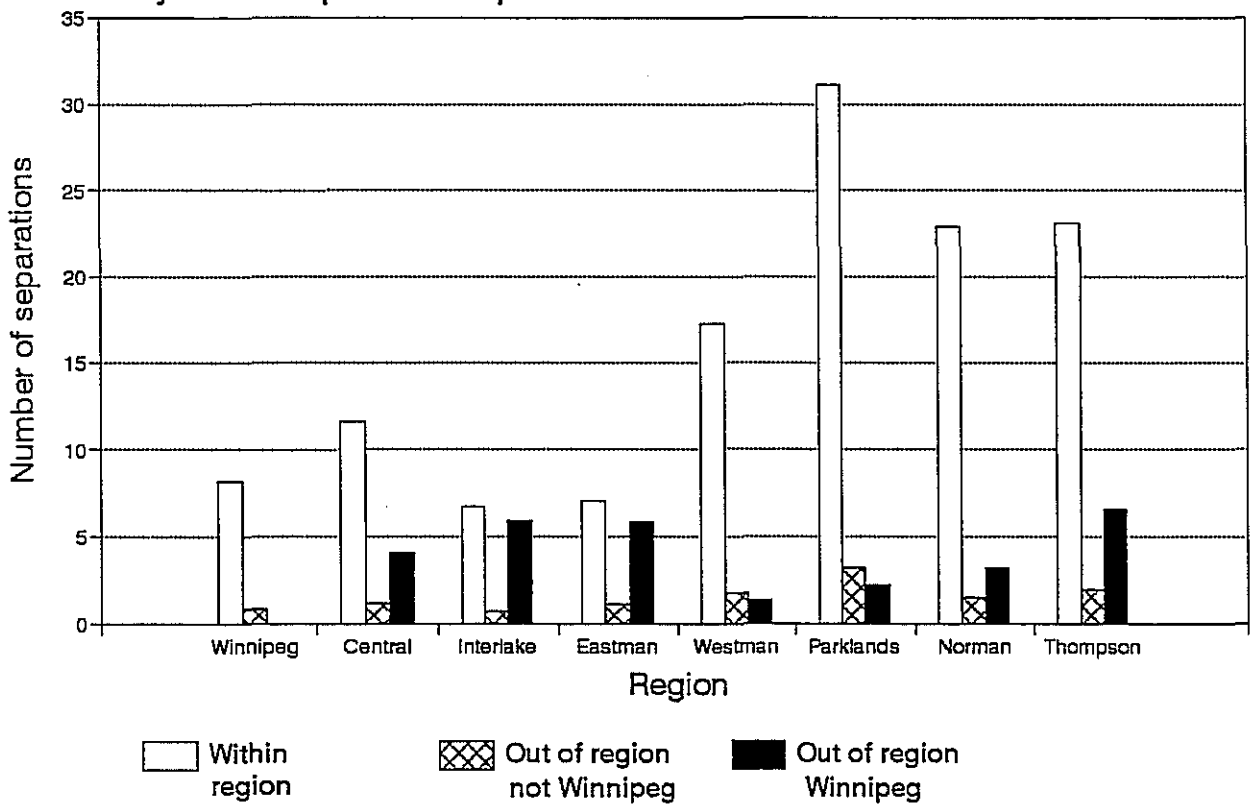
Key Findings: Figure 25

Obstetric care by location of service
Adjusted separations per 1000 residents



Key Findings: Figure 26

Pediatric care by location of service
Adjusted separations per 1000 residents



4. Discussion

On a per capita basis, Winnipeg and rural residents spent a similar number of days in hospital in 1991/92, but had fundamentally different patterns of using hospital care. For acute care (stays lasting from 1 to 59 days), non-Winnipeg residents had 66 percent more separations from hospital and used 37 percent more hospital days than did Winnipeg residents. In contrast, Winnipeg residents used 79 percent more days of hospital care for long stay separations (stays of 60 days and over) and spent 72 percent more of their acute hospital days in technologically sophisticated teaching hospitals relative to rural residents.

In addition to rural/urban differences, there was marked variation across eight Manitoba regions in rates of use of acute hospital care. Variability in use of acute pediatric care was especially high, with adjusted rates varying five-fold across regions, ranging from 35 days to 170 days per 1000 total residents. Over all acute care, Winnipeg residents had the lowest adjusted rates of use and northern areas had the highest rates. Greater use of short stay hospital days was associated with higher rates of use of specific types of care: hospitalizations for patients who had less complex medical conditions and were less severely ill, for care that was less intensive in terms of resource utilization, for very short stays, and for medical diagnoses for which there is an element of discretion in the decision to use hospital resources, some of which may be related to patient socioeconomic factors.

In spite of regional variation in use of acute hospital resources and lower rates of use of teaching hospitals by rural residents, persons residing outside of Winnipeg appeared to have adequate access to surgery and to resource intensive treatments such as bypass surgery and craniotomy. In particular, there were only small differences in overall rates of surgery despite a concentration of surgical specialists in Winnipeg.

The very high rate of use of long stay hospital days by Winnipeg residents (in relation to residents of rural regions) is unexplained. On the surface, it appears unrelated to a shortage of personal care home beds: Winnipeg and non-Winnipeg regions have similar adjusted rates of use of personal care home days per capita, measured both for the population age 75 years and older and the total population (DeCoster, Roos, and Bogdanovic 1993; DeCoster,

personal communication). Winnipeg residents' much higher rate of long stay days in chronic hospitals suggests either higher rates of access for Winnipeg residents, or that rural persons who have long stays in chronic care settings become labelled as Winnipeg residents over time. This finding of high rates of use of long stay days has important implications for resource use: almost one half of hospital days used by Winnipeg residents were used in long stay care and over one quarter of provincial hospital days were used to provide long stay care to Winnipeg residents. These findings were large and unexpected; reasons for the different patterns of use of long stay care need further investigation.

While further work is required to relate indicators of need to utilization rates, Manitoba's acute care hospital system, when described at the regional level, appears to work equitably and in response to different levels of need. The two regions with the highest use of hospitals were also those areas whose residents had the poorest health (as judged by rates of death among those aged 0 to 64 years) and the highest level of socioeconomic risk. In contrast, lower rates of use by Winnipeg residents corresponded to relatively low measures of need in this population. Rates of use were higher than would be expected in Central and Westman, two 'healthier' rural regions.

The finding of very large differences in needs-driven use of acute hospital resources raises important policy questions. Clearly, the system provides a remarkably high level of care to residents of disadvantaged regions. However, given the strong relationship between socioeconomic risk factors, health status, and use of hospital resources, questions emerge about whether investments in high use of hospital resources represent an effective approach to improving population health or whether alternative approaches are more likely to yield benefits.

5. References

Averill RF. Development. Chapter 2 in: DRGs: Their Design and Development. Fetter RB, Brand DA, Gamache D (eds.). *Health Administration Press*, Ann Arbor, 1991.

Birch S, Chambers S. To each according to need: a community-based approach to allocating health care resources. *Can Med Assoc J* 1993; 149(5):607-612.

Brownell M, Roos N. An Assessment of How Efficiently Manitoba's Major Hospitals Discharge Their Patients. *Manitoba Centre for Health Policy and Evaluation*, Winnipeg, 1992.

Carstairs V, Morris R. Deprivation and Health in Scotland. *Aberdeen University Press*, 1991.

Charlson ME, Pompei P, Ales KL, MacKenzie CR. A New Method of Classifying Prognostic Comorbidity in Longitudinal Studies: Development and Validation. *J Chronic Dis*, 1987; 40: 373-383.

Cohen MM, MacWilliam L. Population Health: Health Status Indicators. *Manitoba Centre for Health Policy and Evaluation*, Winnipeg, 1993.

DeCoster C, Roos N, Bogdanovic B. Utilization of Personal Care Home Resources. *Manitoba Centre for Health Policy and Evaluation*, Winnipeg, 1993.

Eyles J, Birch S, Chambers S, et al. A Needs-Based Methodology for Allocating Health Care Resources in Ontario, Canada: Development and an Application. *Soc Sci Med*, 1991; 33 (4):489-500.

Eyles J, Birch S. A population needs-based approach to health care resource allocation and planning in Ontario: A link between policy goals and practice? *Can J Public Health* 1993; 84:112-117.

Fetter R, Freeman J. DRG Refinement with Diagnostic Specific Comorbidities and Complications: A Synthesis of Current Approaches to Patient Classification. Final Report. The Health Care Financing Administration Cooperative Agreement, Numbers 15-C-98930/1-01 and 17-C-98930/1-0251. *Health Systems Management Group*, New Haven, 1989.

Frohlich, N, Mustard, C. Socio-Economic Status and Health: A Preliminary Regional Analysis. *Manitoba Centre for Health Policy and Evaluation*, Winnipeg, 1993.

Iglehart JK. The American health care system: Teaching hospitals. *N Engl J Med* 1993; 329(14):1052-1056.

Mc Laughlin, Normolle DP, Wolfe RA, et al. Small area variation in hospital discharge rates: Do socioeconomic variables matter? *Med Care* 1989; 27:507-521.

McMahon LF, McLaughin CG, Petroni GR, et al. Small area analysis of hospital discharges for musculoskeletal diseases in Michigan: The influence of socioeconomic factors. *Am J Med* 1991; 91:173-179.

McMahon LF, Wolfe RA, Griffith JR, et al. Socioeconomic Influence on Small Area Hospital Utilization. *Med Care* 1993; 5 (Suppl):YS29-YS36.

Manitoba Health Services Commission. Annual Report 1991-92. *Manitoba Health*, Winnipeg, 1993.

Manitoba Health Services Commission. Hospital Abstract User Manual. *Manitoba Health*, Winnipeg, 1987.

National Center for Health Statistics. Births, marriages, divorces, and deaths for February 1993. Monthly Vital statistics report; vol 42 no 2. *Public Health Service*, Hyattsville, Maryland, 1993.

Palmer S, West P, Patrick D, et al. Mortality indices in resource allocation. *Community Med* 1979; 1:275-281.

Satin A, Shasty W. Survey Sampling: A Non-Mathematical Guide. *Statistics Canada*, Ottawa, 1983.

Wennberg, J. Which Rate is Right? *N Engl J Med*, 1986; 314 (5):310-311.

Wennberg J, Freeman J, Culp W. Are Hospital Services Rationed in New Haven or Over-Utilised in Boston? *The Lancet*, 1987; 1:1185-1188.

Wennberg JE, Freeman JL, Shelton RM et al. Hospital use and mortality among Medicare beneficiaries in Boston and New Haven. *N Engl J Med* 1989; 321:1168-1173.

APPENDIX A

HOSPITALS CLASSIFIED BY LEVEL OF CARE
(plus number of rated beds and interprovincial per diem charges for 1991-92)

Level of Care/Role	Hospital Name	Number	Rated Beds	$ Per Diem
TEACHING	Health Sciences Centre	0016	1,084	781.00
	St. Boniface	0005	617	762.50
	Sub-Total/Average		1,701	771.75
URBAN COMMUNITY	Brandon	0001	291	483.00
	Concordia	0009	136	407.35
	Grace	0003	301	365.90
	Misericordia	0004	409	441.00
	Seven Oaks	0011	326	438.20
	Victoria	0007	246	421.70
	Sub-Total/Average		1,709	426.19
MAJOR RURAL	Dauphin	0122	105	341.70
	Flin Flon	0134	100	401.30
	Morden	0153	48	308.40
	Portage	0162	104	264.50
	Selkirk	0173	75	408.00
	Steinbach	0110	60	270.45
	Swan River	0177	68	263.80
	The Pas	0170	84	576.40
	Thompson	0187	100	491.15
	Winkler	0109	57	299.50
	Sub-Total/Average		801	362.52
INTERMEDIATE RURAL (Continues next page)	Altona	0102	32	225.60
	Beausejour	0107	30	212.70
	Carman	0116	30	288.10
	Churchill Health Centre	0130	31	720.15
	Gimli-Johnson Memorial	0146	35	309.40
	Minnedosa	0152	35	358.80

Role	Hospital Name	Number	Rated Beds	$ Per Diem
INTERMEDIATE RURAL (Cont'd)	Neepawa	0158	38	236.65
	Souris	0175	30	219.75
	Ste. Rose	0172	68	298.95
	Virden	0180	32	288.45
	Sub-Total/Average		361	315.85
SMALL RURAL (Continues next page)	Arborg	0103	16	353.50
	Ashern-Lakeshore	0178	16	333.20
	Baldur	0106	16	243.50
	Birtle	0171	19	303.65
	Boissevain	0113	12	325.00
	Carberry-Fox Memorial	0135	29	220.40
	Crystal City-Rock Lake	0119	16	345.75
	Deloraine-South West Health District	0123	18	241.75
	Emerson	0131	12	336.45
	Erickson	0129	12	189.05
	Eriksdale-E.M. Crowe Memorial	0128	17	300.50
	Gladstone-Seven Regions	0138	20	428.65
	Glenboro	0139	14	390.60
	Grandview	0140	18	318.55
	Hamiota	0143	21	261.95
	Hodgson-Percy E. Moore	0210	16	235.60
	Killarney-Tri Lake H.C.	0148	26	246.30
	McCreary-Alonsa	0150	13	401.65
	Melita-Wilson Memorial	0184	11	324.00
	Morris	0154	33	302.80
	Notre Dame	0159	10	342.80
	Pinawa	0163	17	338.55
	Pine Falls	0161	35	333.05
	Rivers-Riverdale	0166	16	328.35

Role	Hospital Name	Number	Rated Beds	$ Per Diem
SMALL RURAL (Cont'd)	Roblin	0165	25	218.35
	Russell	0169	38	205.80
	Ste. Anne	0179	21	295.85
	St. Claude	0182	12	363.60
	St. Pierre-Desalaberry	0124	16	265.80
	Shoal Lake-Strathclair	0174	23	294.90
	Stonewall-Dr. Evelyn Memorial	0176	18	263.45
	Swan Lake-Lorne Memorial	0147	22	291.45
	Teulon-Hunter Memorial	0144	20	295.20
	Treherne-Tiger Hills Health District	0183	18	326.20
	Vita	0181	11	222.60
	Wawanesa	0186	9	338.40
	Winnipegosis	0118	18	274.65
	Sub-Total/Average		684	300.05
SMALL MULTI-USE FACILITIES	Benito	0108	9	373.45
	MacGregor-North Norfolk	0156	6	258.05
	Manitou-Pembina	0151	14	422.15
	Reston	0164	17	316.55
	Rossburn	0167	10	274.85
	Whitemouth	0185	6	442.20
	Sub-Total/Average		62	347.88
NORTHERN, ISOLATED FACILITIES	Gillam	0136	10	526.10
	Leaf Rapids	0155	8	487.45
	Lynn Lake	0149	25	652.30
	Norway House	0212	16	259.50
	Snow Lake	0111	4	545.80
	Sub-Total/Average		63	494.23

Role	Hospital Name	Number	Rated Beds	$ Per Diem
NURSING STATIONS	Berens River	0287	6	113.40
	Bloodvein	0288	2	113.40
	Brochet	0282	3	116.60
	Cross Lake	0271	4	113.40
	Garden Hill	0273	3	113.40
	God's Lake	0272	4	113.40
	Lac Brochet	0290	2	116.60
	Little Grand Rapids	0274	4	116.60
	Nelson House	0277	4	116.60
	Oxford House	0278	3	113.40
	Poplar River	0285	4	116.60
	Pukatawagan	0281	4	116.60
	Red Sucker Lake	0289	2	116.60
	St. Therese	0280	3	113.40
	Shamatawa	0284	4	116.60
	South Indian Lake	0283	6	116.60
	Split Lake	0279	4	116.60
	Wassagamack	0286	1	113.40
	Sub-Total/Average		63	115.18
CHRONIC AND REHABILITATION	Deer Lodge	0019	120	223.54
	Winnipeg Municipal	0006	337	275.90
	Rehabilitation Centre for Children	0017	20	357.90
	Adolescent Treatment Centre	0020	25	500.00
	Sub-Total/Average		502	339.34
PERSONAL CARE HOMES	Cartwright	0117	10	189.75
	Elkhorn	0127	8	202.65
	Hartney	0142	9	173.45
	Sub-Total/Average		27	188.62

Role	Hospital Name	Number	Rated Beds	$ Per Diem
OUT OF PROV	Information Not Available	-	-	-

APPENDIX B

VOLUME II: LIST OF TABLES

MANITOBA CENTRE FOR HEALTH POLICY AND EVALUATION

Report List: January 1994

Number	Title and Author(s)
91-04-01	*Manitoba Health Care Studies and Their Policy Implications*, by Evelyn Shapiro
91-05-02	*Hospital Funding within the Health Care System: Moving Towards Effectiveness*, by Charlyn Black, M.D., Sc.D. and Norman Frohlich, Ph.D.
91-11-04	*Maternal Demographic Risk Factors and the Incidence of Low Birthweight, Manitoba 1979-1989*, by Cam Mustard, Sc.D.
92-10	*An Assessment of How Efficiently Manitoba's Major Hospitals Discharge Their Patients*, by Marni Brownell, Ph.D. and Noralou Roos, Ph.D.
93-01	*The Utilization of Prenatal Care and Relationship to Birthweight Outcome in Winnipeg, 1987-88*, by Cam Mustard, Sc.D.
93-02	*Assessing Quality of Care in Manitoba Personal Care Homes by Using Administrative Data to Monitor Outcomes*, by Evelyn Shapiro, M.A. and Robert B. Tate, M.Sc.

Population Health Information System (analyses for 1991/92 to be released in 1993/94)

Population Health: Health Status Indicators, by Marsha Cohen, M.D., F.R.C.P.C. and Leonard MacWilliam, M.Sc., M.N.R.M.

Socio-Economic Characteristics, by Norman Frohlich, Ph.D. and Cam Mustard, Sc.D.

Utilization of Hospital Resources, by Charlyn Black, M.D., Sc.D., Noralou Roos, Ph.D. and Charles Burchill, B.Sc., M.Sc.

Utilization of Personal Care Home Resources, by Carolyn DeCoster, R.N., M.B.A., Noralou Roos, Ph.D. and Bogdan Bogdanovic, B. Comm., B.A.

Utilization of Physician Resources, by Douglas Tataryn, Ph.D. and Noralou Roos, Ph.D.

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